3. DESCRIPTION OF MINERAL RESOURCES

SECTION 3
DESCRIPTION OF MINERAL RESOURCES

Categorization of mineral resources as locatable, leasable, or salable is based on provisions of the General Mining Law of 1872, which declared that "all valuable mineral deposits in lands belonging to the United States…to be free and open to exploration and purchase." The federal regulations further defined a locatable mineral or a valuable mineral as being "whatever is recognized as a mineral by the standard authorities, whether metallic or other substances, when found in public lands in quantity and quality sufficient to render the lands valuable on account thereof" (Maley 1977).

Whether or not a particular mineral deposit is locatable depends on a number of factors, including quality, quantity, minability, demand, and marketability, that create an economically viable resource. The number of locatable minerals originally authorized by the General Mining Law of 1872 has been substantially reduced over time, by several subsequent acts, which include the following:

- The Mineral Leasing Act of 1920, as amended;
- The Materials Act of July 31, 1947, as amended;
- The Geothermal Steam Act of 1970, as amended; and
- The Acquired Lands Leasing Act of August 7, 1947.

The Mineral Leasing Act of 1920, as amended, authorized that certain minerals may be acquired only through the mineral leasing system. These included deposits of oil, gas, coal, potassium, sodium, phosphate, oil shale, native asphalt, solid and semisolid bitumen, and bituminous rock, including oil-impregnated rock or sands, and deposits of sulfur.

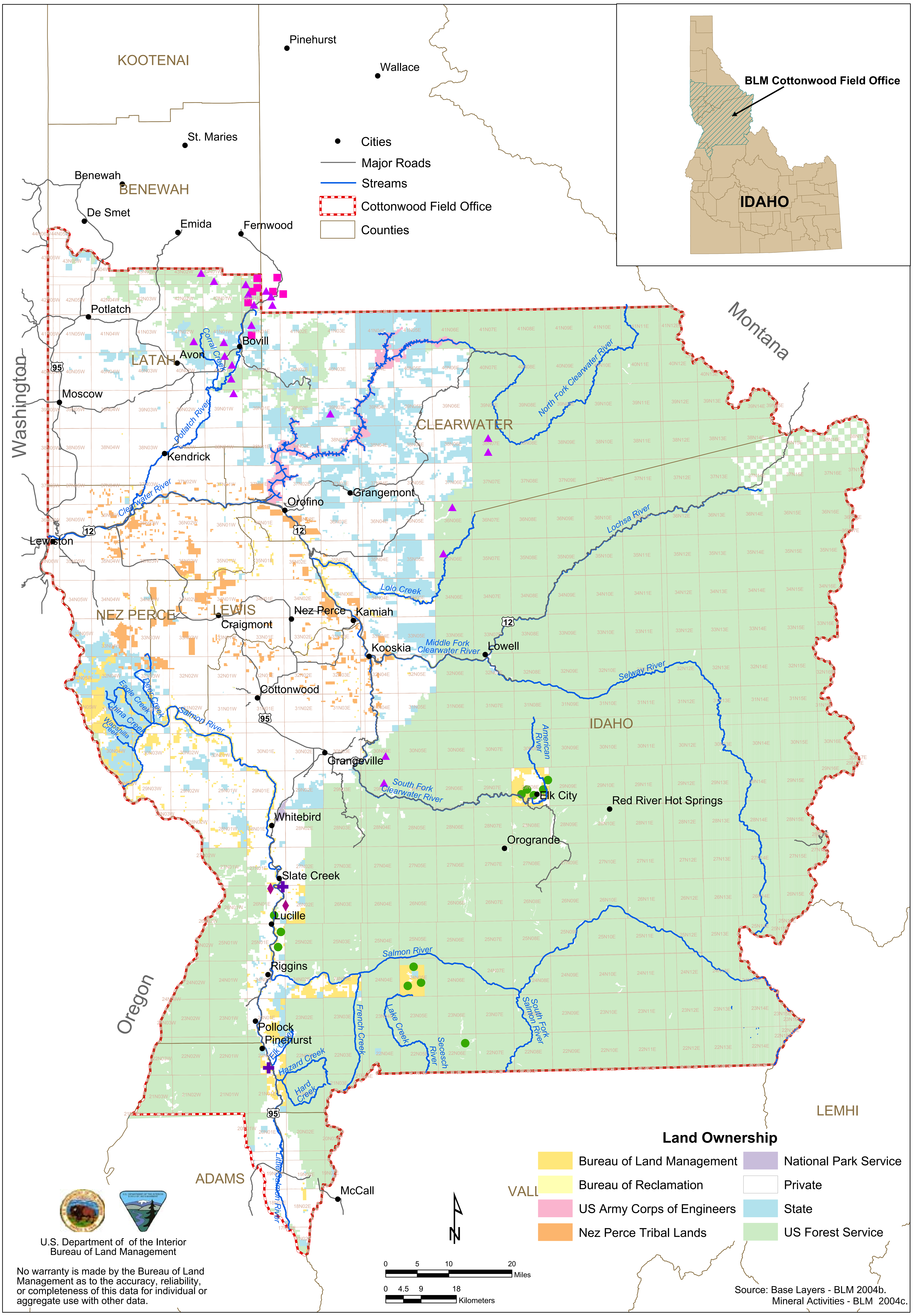
The Geothermal Leasing Act of 1970, as amended, authorized the rights to develop and utilize geothermal resources in land subject to these regulations, under the federal leasing laws.

The Materials Act of July 31, 1947, as amended by the Act of July 23, 1955, further excluded common varieties of sand, stone, gravel, pumice, cinders, and clay from location. These materials-bearing areas are available only through a salable contract. Those minerals considered nonlocatable generally have a normal quality and a value for ordinary use and include ordinary varieties of clay, limestone, sand, and gravel (Maley 1977). However, the uncommon varieties of sandstone, gravel, pumice, pumicite, cinders, and clay remain open to location.

The Acquired Lands Leasing Act of August 7, 1947, provides that title to lands obtained from a private owner under special circumstances, such as purchase, condemnation, or donation, are subject to mineral leasing, provided mineral title is also acquired. Mineral locations are not permitted on acquired lands (Maley 1983).

Idaho has enjoyed a long and varied history of mining that continues even today. The initial discovery of gold near Pierce, Idaho, in 1860 created a rush of prospecting and development that caused the Idaho Territory to be established in 1863. Interest in gold mining continues to this day as individuals and companies search for commercial gold deposits. Garnet and clay deposits have been mined during the past century and continue to be important today. Mineral materials, such as sand and gravel, crushed aggregate, and dimension or decorative stone, grow in importance as demand for these materials increases with urban population expansion. Even public recreation activities, such as recreational garnet operations, placer gold recovery, fossil or mineral collecting, and recognition of unique and distinctive geological viewing sites, create a continual impact within the planning area.

The activity level for the BLM mineral management responsibility is highly variable throughout the planning area and has historically fluctuated, depending on the viability of various sectors of the mining industry. The BLM Cottonwood Field Office continues to address the mineral issues on public lands and is involved in an ongoing high level of administration related to leasable, locatable, and salable materials in the planning area. A snapshot of the most recent mineral activities administered by and/or approved by the BLM's Cottonwood Field Office is shown on **Figure 3-1.** A map of the historical mines and prospects within the Cottonwood Field Office area is displayed in **Figure 3-2.** The BLM administers all of the mining claims within the planning area, including those on National Forest Service Lands, as permanent records within the state offices.



Mineral Activities

Cottonwood Field Office, Idaho

- Plans of Operation
- Acquired Lands Leases
- Inactive Leases
- Saleable Materials Contracts
- Right-of-Way Leases

Figure 3-1

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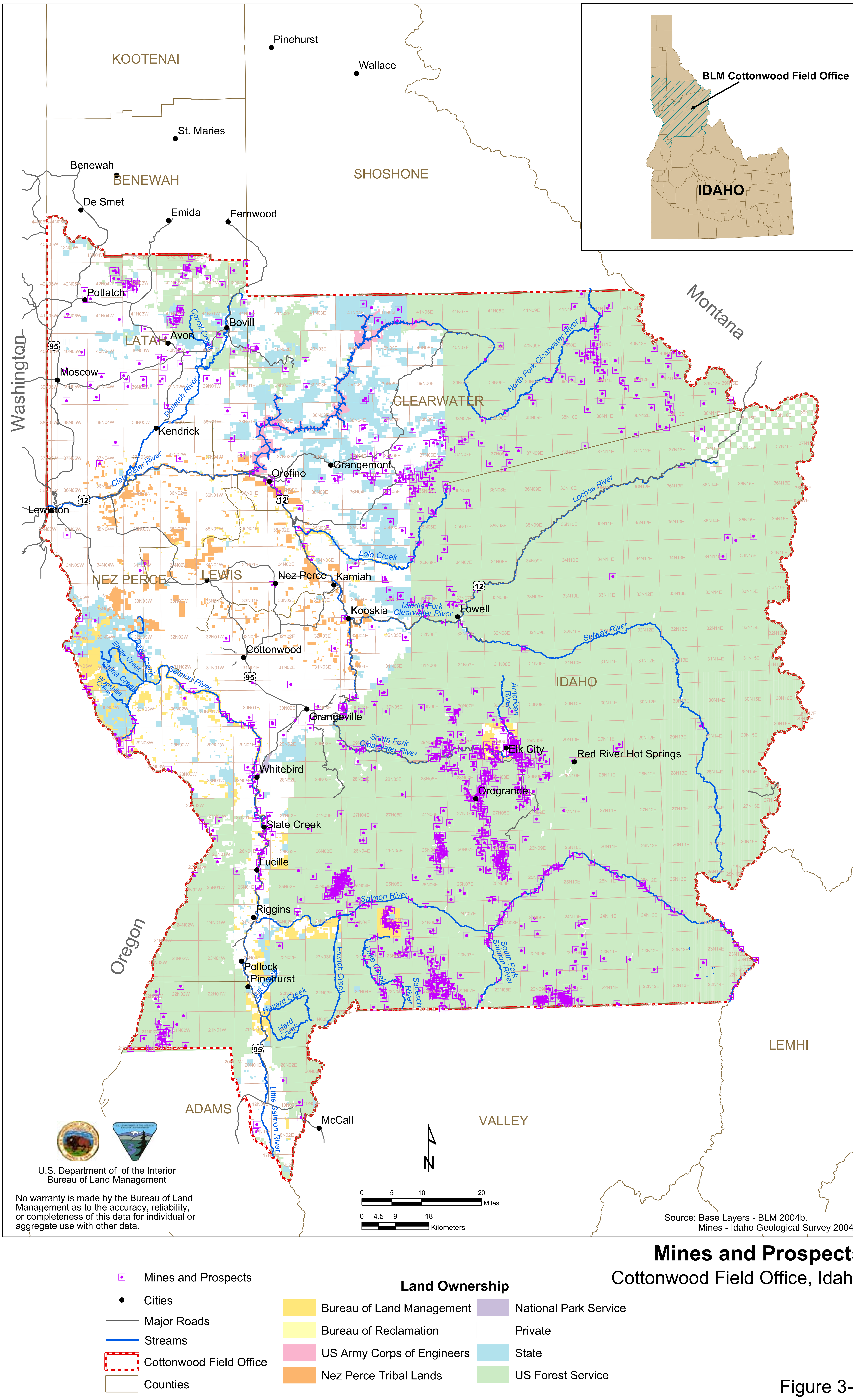

Mines and Prospects
Cottonwood Field Office, Idaho

Figure 3-2

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The current operating permits and operating plans within the Cottonwood Field Office area are shown in **Table 3-1** (Sanner 2004). There are a total of 12 active permits and plans covering a total of 215.51 acres, which range in status from expired/reclamation to pending or authorized. These include a variety of commodities from lode gold, to gold placer, to silver and are either within the Elk City, Marshal Mountain, or Salmon River areas.

Table 3-1
Operating Permits and Plans—BLM Cottonwood Field Office

Num	Serial # ID	Location Twp	Rng	Sec	Commodity # Type	Case Disposition	Total Acres	County	Management Agency
ACTIVE PERMITS AND PLANS									
1	#029393	24N	05E	8	261 gold lode	Reclamation	1.00	Idaho	BLM
2	#029400	25N	01E	2	262 gold placer	Inactive	1.00	Idaho	BLM
3	#029402	26N	01E	26	262 gold placer	Inactive	1.00	Idaho	BLM
4	#029403	25N	01E	23	262 gold placer	Inactive	1.00	Idaho	BLM
5	#029405	29N	08E	20	261 gold lode	Reclamation	200.00	Idaho	BLM
6	#029406	22N	06E	11	261 gold lode	Inactive	1.00	Idaho	BLM
7	#030811	24N	05E	9	261 gold lode	Reclamation	5.00	Idaho	BLM
8	#032700	29N	08E	23	262 gold placer	Reclamation	3.00	Idaho	BLM
9	#033938	24N	05E	20	261 gold lode	Reclamation	1.00	Idaho	BLM
10	#034481	24N	05E	22	261 gold lode	Pending	1.00	Idaho	BLM
11	#034712	29N	08E	28	262 gold placer	Pending	0.01	Idaho	BLM
							0.50		
12	#034713	29N	08E	20	261 gold Lode	Reclamation		Idaho	BLM
						Total Acres	**215.51**		
RIGHT-OF-WAY MINERAL ACTIVITY									
1	#0001119	26N	01E	2	Material ROW	Perpetual	18.75	Idaho	Idaho Department of Transportation/BLM
2	same	27N	01E	35	Material ROW	Perpetual		Idaho	Idaho Department of Transportation/BLM
3	#0012588	26N	01E	13	Material ROW	Perpetual	15.80	Idaho	Idaho Department of Transportation/BLM
						Total Acres	**34.55**		

Source: BLM 2000, 2004

There are no active mineral leases within the planning area. Historical information on oil and gas leases is included in **Appendix A** (Oil and Gas Leases–Case Recordation), which was obtained from the BLM LR2000 files. During the 1980s, oil and gas leasing was at a maximum within the planning area due to the higher oil and gas prices and the interest of oil companies in the exploration of unconventional geological terrains within northern Idaho. This resulted in the BLM issuing 359 leases, covering 2,382,793.48 acres.

The BLM administers the leases and prospecting permits on acquired lands; currently, there are eight such leases, totaling 2,237.14 acres, as outlined in **Table 3-2.** Over the past twenty years during the term of the current MFP (BLM 1981), there have been a total of 41 leases or prospecting permits, covering 23,846.8 acres, issued on acquired lands **(Table 3-2).** Most of these inactive leases have been for garnet recovery in the Emerald Creek area of Latah and Clearwater Counties, with a few dedicated to gold, silver, or base metal exploration throughout the planning area. The information on the acquired land leases in **Appendix B** was obtained from the BLM LR2000 files on November 12, 2004.

The active material sales contracts on BLM land within the Cottonwood field office are shown in **Table 3-3.** There are three material saleable contracts that cover crushed stone used for aggregate, totaling 80.10 acres in Idaho County.

Additional detail about these mineral material contracts is included in **Appendix C.**

There are two right-of-way leases, covering 34.55 acres, issued by the BLM for sand/gravel and aggregate material along the Salmon River in Idaho County, as outlined in **Table 3-1**.

The mineral resource occurrence and potential for fluid minerals (oil and gas) and coal in the Cottonwood planning area has been evaluated. Also, the mineral resource potential for geothermal resources in the Cottonwood planning area has been evaluated.

The mineral resource potential for nonfluid minerals in the Cottonwood planning area has been evaluated. A wide range of nonfluid minerals is present, including each of the classification categories: leasable, locatable, and salable minerals.

In general, the nonfluid minerals of greatest economic significance within the planning area include precious metals, aggregates, garnets, clay, and dimension/decorative stone. While a number of other nonfluid commodities are known to be present within the planning area, most occur in minor deposits. Other mineral types and occurrences are of subeconomic classification and as such are unlikely to be considered for development within the projected planning period.

Table 3-2
Mineral Leases and Prospecting Permits—Acquired Lands BLM Cottonwood Field Office

Num	Serial # IDI	Location Twp	Rng	Sec	Commodity # Type	Case Disposition	Total Acres	County	Management Agency	Inferred Minerals
ACTIVE										
1	#016415	42N	01E	9	184 Ab, garnet	Renewal pending	40.00	Latah	St. Joe NF	garnet
2	#025554	42N	01E	3, 4, 9	184 Ab, garnet	Renewal pending	74.60	Latah	St. Joe NF	garnet
3	#02858201	41N	01E	8, 9	184 Ab, garnet	Authorized	100.00	Latah	St. Joe NF	garnet
4	#02952901	42N	01E	9, 16	256 gemstone	Authorized	80.00	Latah	St. Joe NF	garnet
5	#029619	42N	01E	9, 10 15, 16	800 two minerals	Pending	1,552.50	Latah	St. Joe NF	garnet
6	#03126001	36N	6E	6	260 gold	Authorized	41.32	Clearwater	Clearwater NF	gold
7	#034321	42N	01E	9, 10 15, 16	184 Ab, garnet	Pending	317.27	Latah	St. Joe NF	garnet
8	#034768	40N	11E	20	800 two minerals	Pending	31.45	Clearwater	Clearwater NF	silica
						Total Acres	**2,237.14**			
INACTIVE-CASE CLOSED										
1	#927243	29N	04E	14-23	#800 two minerals	closed 12/18/89	322.50	Idaho	Nez Perce NF	gold
2	#020528	29N	04E	14-23	#800 two minerals	closed 3/29/93	332.50	Idaho	Nez Perce NF	gold
3	#019947	30N	04E	14-23	#800 two minerals	closed 10/18/83	332.50	Idaho	Nez Perce NF	gold
4	#024490	32N	06E	1-7, 12	#800 two minerals	closed 11/10/87	308.50	Idaho	Clearwater NF	gold
5	#024490	33N	06E	32, 33	#800 two minerals	closed 11/10/87	308.50	Idaho	Clearwater NF	gold
6	#018838	35N	06E	5, 20	#262 gold placer	closed 9/26/86	730.84	Clearwater	Clearwater NF	gold
7	#018838A	35N	06E	8, 18	#262 gold placer	closed 9/26/86	258.10	Clearwater	Clearwater NF	gold
8	#025824	36N	03E	26	#091 limestone	closed 9/05/96	80.00	Clearwater	Clearwater NF	limestone
9	#018708	36N	03E	26	#800 two minerals	closed 8/15/88	80.00	Clearwater	Clearwater NF	limestone
10	#018708A	36N	03E	26	#800 two minerals	closed 8/15/88	80.00	Clearwater	Clearwater NF	limestone
11	#020810	36N	06E	5	#800 two minerals	closed 2/14/86	61.51	Clearwater	Clearwater NF	gold
12	#031260	36N	06E	6	#800 two minerals	closed 9/01/03	41.32	Clearwater	Clearwater NF	gold
13	#020605	38N	07E	4, 9	#650 uranium	closed 12/06/84	800.00	Clearwater	Clearwater NF	uranium
14	#019369	38N	07E	16, 21	#911 all minerals	closed 12/02/85	680.00	Clearwater	Clearwater NF	uranium
15	#019494	39N	03E	19	#260 gold	closed 7/31/86	80.00	Clearwater	St. Joe NF	gold
16	#03029301	40N	01W	27	#135 clay	closed 4/28/03	51.46	Latah	St. Joe NF	clay
17	#022056	40n	01W	3, 9	#135 clay	closed 5/23/86	2,232.17	Latah	St. Joe NF	clay
18	#022055	40N	01W	2, 23	#135 clay	closed 5/23/86	2,520.67	Latah	St. Joe NF	clay
19	#020393	40N	01W	2, 23	#135 clay	closed 12/29/97	51.46	Latah	St. Joe NF	clay

Table 3-2
Mineral Leases and Prospecting Permits—Acquired Lands BLM Cottonwood Field Office *(continued)*

Num	Serial # IDI	Location Twp	Rng	Sec	Commodity # Type	Case Disposition	Total Acres	County	Mgmt Agency[1]	Inferred Minerals
20	#034647	40N	01W	27	#184 garnet	closed 12/18/03	51.00	Latah	St. Joe NF	garnet
21	#030495	40N	11E	20	#800 two minerals	closed 8/18/95	35.52	Latah	Clearwater NF	garnet
22	#028582	41N	01E	8,9	#800 two minerals	closed 7/26/95	100.00	Latah	St. Joe NF	garnet
23	#031649	41N	01E	9	#255 gemstones	closed 12/09/99	200.00	Latah	Clearwater NF	garnet
24	#030621	41N	01E	9	#800 two minerals	closed 1/24/96	100.00	Latah	Clearwater NF	garnet
25	#022057	41N	01W	27, 34	#135 clay	closed 5/23/86	1,929.99	Latah	St. Joe NF	clay
26	#029049	41N	02W	22, 27	#186 feldspar	closed 4/28/93	110.00	Latah	St. Joe NF	feldspar
27	#028986	41N	02W	22	#390 mica	closed 4/28/93	29.23	Latah	St. Joe NF	mica
28	#029620	42N	01E	19, 22	#800 two minerals	closed 7/12/95	2,500.08	Latah	St. Joe NF	garnet
29	#016415	42N	01E	9	#800 two minerals	closed 4/30/98	40.00	Latah	St. Joe NF	garnet
30	#025554	42N	01E	3, 9	#184 garnet	closed 6/30/1999	74.60	Latah	St. Joe NF	garnet
31	#029529	42N	01E	9, 16	#800 two minerals	closed 7/22/98	960.00	Latah	St. Joe NF	garnet
32	#023212	42N	01E	4	#184 garnet	closed 4/20/87	226.61	Latah	St. Joe NF	garnet
33	#018981	42N	01E	4, 9	#910 all leasable	closed 2/10/84	120.00	Latah	St. Joe NF	garnet
34	#029327	42N	01E	9, 16	#800 two minerals	closed 9/02/92	960.00	Latah	Coeur d'Alene NF	garnet
35	#026338	42N	01E	9	closed no action	closed 5/27/89	4.60	Latah	St. Joe NF	garnet
36	#029619	42N	01E	9, 16	#800 two minerals	closed 5/31/98	1,552.50	Latah	St. Joe NF	garnet
37	#029618	42N	01E	7, 18	#800 two minerals	closed 7/12/95	2,555.44	Latah	St. Joe NF	garnet
38	#029617	42N	01E	3, 7	#800 two minerals	closed 7/12/95	2,358.62	Latah	St. Joe NF	garnet
39	#027939	42N	01W	23, 26	#800 two minerals	closed 1/29/92	520.00	Latah	St. Joe NF	garnet
40	#028149	42N	01W	23, 26	#800 two minerals	closed 3/24/92	10.00	Latah	St. Joe NF	garnet
41	#032641	43N	01W	31	#260 gold	closed 6/16/00	56.62	Latah	St. Joe NF	gold
						Total Acres	**23,846.84**			

[1] NF = National Forest (US Department of Agriculture, Forest Service)
Source: BLM 2000, 2004

Table 3-3
Mineral Material Contracts—BLM Cottonwood Field Office

Num	Serial # IDI	Location Twp	Rng	Sec	Commodity # Type	Case Disposition	Total Acres	County	Management Agency
ACTIVE									
1	#027536	29N	08E	13	562 stone, crush	Pending	40.00	Idaho	BLM
2	#033931	22N	01E	22	562 stone, crush	Authorized	40.00	Idaho	BLM
3	#034241	26n	01E	1	562 stone, crush	Authorized	0.10	Idaho	BLM
						Total Acres	**80.10**		

Source: BLM 2000

Gold has been one of the major minerals to be mined since the initial discoveries in the new Idaho Territory in 1861, and it continues to generate interest in exploration, although no new significant development has occurred in the last decade in the planning area. Future development depends on gold prices and environmental/political factors that make future estimates unpredictable.

Garnet mining in the Emerald Creek area over the past several decades has provided enough abrasive material to rank Idaho as the number one producer in the US. Previously clay was a major mining component from a number of mines located near Bovill, Latah County.

Aggregate resources are present throughout the planning area and are subject to increasing consumptive demand as a result of urban building and development. Similarly, dimension and decorative stone are in increasing demand for architectural and landscaping applications.

3.1 LEASABLE MINERALS

Leasable minerals are governed by the Mineral Leasing Act of 1920, as amended, which authorized that specific minerals no longer be locatable but instead be disposed of through a leasing system. Currently there are no minerals held under the Mineral Leasing Act of 1920 within the RMP planning area.

There are no significant occurrences of leasable minerals within the planning area. Potential leasable minerals include coal and limestone. Oil and gas leasing in the future is not considered to be important in the planning area.

Geothermal resource leasing is authorized under the Geothermal Steam Act of 1970, as amended. There are no geothermal leases or known geothermal resources areas, or KGRAs, within the planning area. The Idaho Department of Water Resources identifies, catalogs, and records data on hot springs in Idaho, under the Energy-Geothermal Division.

Under certain circumstances federal acquired lands are subject to leasing under the Acquired Land Leasing Act of 1947. The BLM issues the leases for a wide variety of minerals, but the surface management resides with the agency responsible for the surface. Currently there are three authorized leases under this jurisdiction within the planning area.

3.1.1 Coal

Idaho has not been a significant producer of coal and only a few areas in the southeast corner of the state contain coal beds of sufficient size and quality to be commercially developed. The nearest coal occurrence is in the Orofino area where coal is of inferior quality and ranges in rank from lignite to subbituminous. It occurs as thin beds within the Latah Formation of Miocene age, interbedded within the Columbia River Basalts. (US Geology Survey 1964).

There are no identified coal resources anywhere within the planning area, and only a few coal occurrences in northern Idaho.

3.1.2 Peat

Peat is a semicarbonized vegetable tissue formed by the partial decomposition of various plants in water. It is formed in the primary stage of the conversion of vegetable matter into coal but has a very low Btu content. The climatic conditions that favor development of peat include stable air temperatures, high humidity, high annual rainfall, anoxic conditions, and flat to gently sloping drainage, particularly in glaciated areas. Peat accumulates extremely slowly, with replenishment of supplies taking several thousand years to form. In the planning area, peat is found at higher elevations in the central part of the state.

There are no identified peat resources within the planning area (US Geological Survey 1964).

3.1.3 Geothermal Resources

According to the Geothermal Steam Act of 1970, as amended, (84 Stat. 1566: 30 USC 1001-1025), geothermal resources are as follows:

- All products of geothermal processes, embracing indigenous steam, hot water, and hot brines;
- Steam and other gases, hot water, and hot brines resulting from water, gas, or other fluids artificially introduced into geothermal formations;

- Heat or other associated energy found in geothermal formations: and
- Any byproduct derived from them.

The act provides the Secretary of the Interior with the authority to lease public lands and other federal lands, including National Forest lands, for geothermal exploration and development in an environmentally sound manner. This authority has been delegated to the BLM, which implements the act through the regulations contained in 43 Code of Federal Regulations (CFR), Part 3200.

Geothermal leases are issued through competitive bidding for federal lands with a KGRA or noncompetitively for federal lands outside a KGRA.

In Idaho, the Geothermal Resources Act (Idaho Code Title 41, Chapter 40) defines any groundwater having a bottom-hole temperature of greater than 100 degrees Centigrade as a geothermal resource. Geothermal resources are put into a classification separate from water resources or mineral resources, and permits separate from those other resources must be obtained for their extraction and use.

The Idaho Constitution declares that all waters within the state, both surface and ground, are "subject to the regulations and control of the state in the manner prescribed by law." In addition to leases, development on federal land of any proposed power generation facility would also require that water rights be conveyed by the State of Idaho. These rights would have to include any nonthermal ground and/or surface waters used for cooling or other applications, in addition to the federal geothermal rights (Idaho Department of Water Resources 2002).

If the surface water rights to a potential development have not been established prior to 1971 or not adjudicated in the Snake River Basin Adjudication, the owner or developer must apply for a water right with the Idaho Department of Water Resources. If a groundwater right has not been established prior to 1963 or not adjudicated in the Snake River Basin Adjudication, the owner or developer must apply to the Idaho Department of Water Resources for the groundwater rights. Therefore, in nearly all circumstances, the necessary water rights (surface and groundwater) must be obtained from the department through an application and permitting process (Idaho Department of Water Resources 2002).

According to the Boise Office of the BLM, as of November 15, 2004, there are currently no geothermal leases or claims on federal lands within the planning area.

Idaho has an abundance of geothermal resources, which is evidenced by the occurrence of 308 hot springs and 745 geothermal wells (Idaho Department of Water Resources 2002). The designation for geothermal resources in Idaho is outlined below:

- Warm spring (68-85 degrees Fahrenheit [F]);
- Geothermal spring (>85 degrees F);
- Warm well (68-85 degrees F); and
- Geothermal well (>85 degrees F).

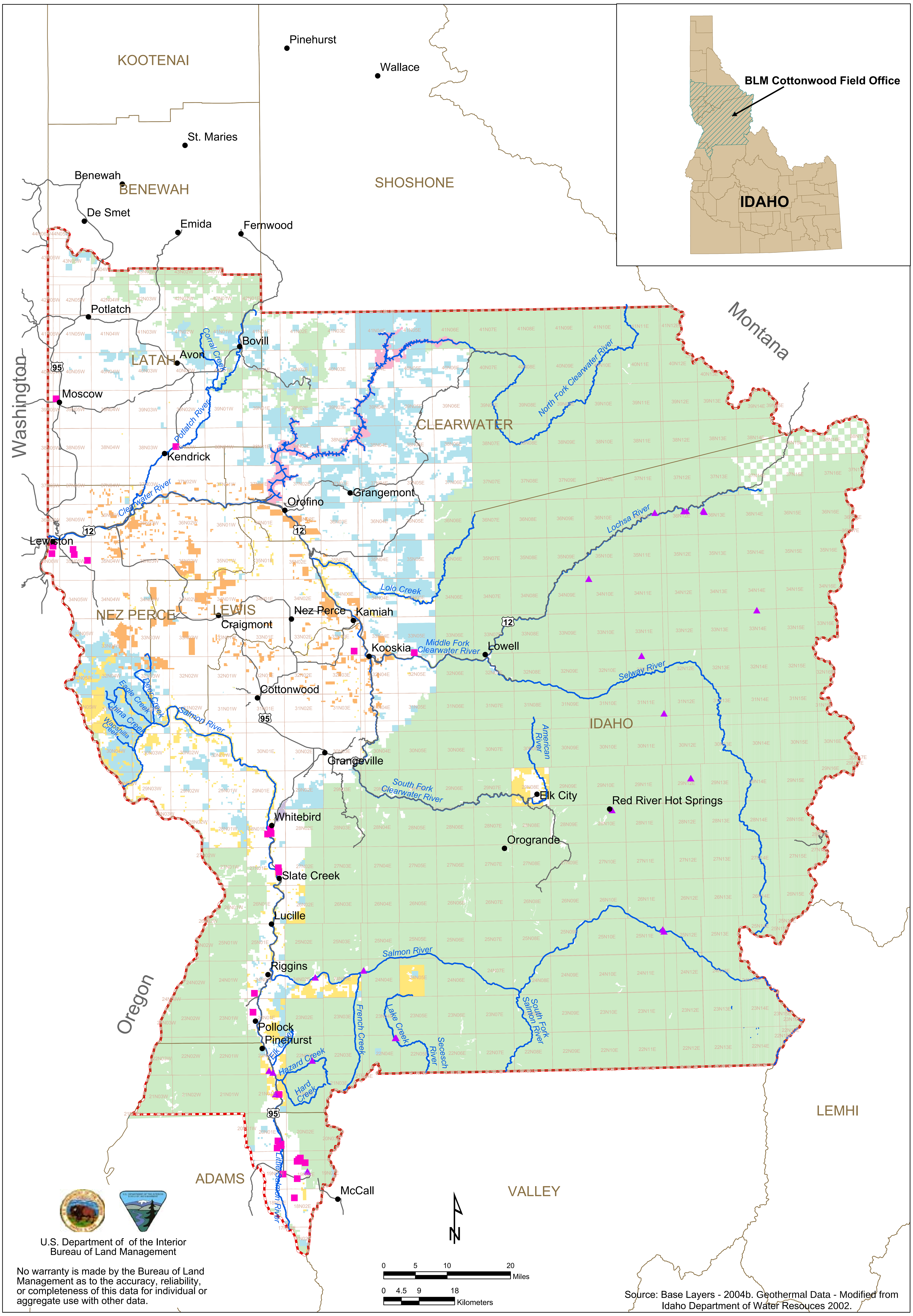
The designation of an area as a KGRA means an area in which the geology, nearby discoveries, competitive interests, or other factors would indicate that the prospects for extraction of geothermal steam or associated geothermal resources are good enough to warrant expenditure of money for that purpose (Maley 1977).

There are warm springs and wells throughout the planning area, as shown in **Figure 3-3.** Most of the wells are along the Salmon and Little Salmon Rivers, between Whitebird and McCall, Idaho. The warm springs are present along the main Salmon River around Riggens (113 degrees F), at Burgdorf Hot Springs (120 degrees F), near Red River Hot Springs (130 degrees F), and in eastern Idaho County near the Montana border (113-122 degrees F). There are also a number of warm water wells in the Lewiston area. Data relating to all hot-springs and wells within Idaho is presented on the Idaho Water Resources Institute Map (Dansart et al 1994). None of the wells or springs qualifies as a geothermal resources site by the Idaho Department of Water Resources. There are no geothermal resources either in wells or springs within the planning area.

3.1.4 Oil and Gas

Oil and gas exploration and development has been minimal in the planning area due to the presence of unfavorable lithologies, widespread intrusion of the Idaho Batholith and related Tertiary plutons, moderate to high metamorphic grade of the Pre-Tertiary rocks, and no indications of hydrocarbons in the region.

Extensive leasing for oil and gas occurred in northern Idaho in the 1980s, as outlined in BLM Case Information on Oil and Gas in Northern Idaho **(Appendix A).** Over 2.4 million acres of oil and gas leases were filed with the BLM at this time, but all cases were closed by the mid-1990s. This leasing activity may have been in response to potential oil and gas targets within pre-Columbia River Basalt Tertiary basin sediments that occur elsewhere in the Columbia River Plateau of eastern Washington or within the exotic Mesozoic



Geothermal Resources

Cottonwood Field Office, Idaho

Geothermal Springs
Geothermal Wells

Cities
Major Roads
Streams
Cottonwood Field Office
Counties

Land Ownership

Bureau of Land Management
Bureau of Reclamation
US Army Corps of Engineers
Nez Perce Tribal Lands
National Park Service
Private
State
US Forest Service

Figure 3-3

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Seven Devils Terrain that occurs immediately below the Tertiary volcanics. There was also some interest in identifying potential targets in Paleozoic/Mesozoic sedimentary units that were postulated to lie beneath over-thrust units of the Belt Basin Super-Group in Montana and possibly northern Idaho. This exploration effort was unsuccessful in locating favorable targets beneath the Belt Series.

There have been five holes drilled in northern Idaho, as outlined in **Table 3-4** (Idaho Geological Survey 1984). There have been three oil/gas drill holes within the planning area, one in Nez Perce County (1923) and two in Lewis County (1974, 1982). Projected targets are unknown, although it appears they may have been drilling for the Seven Devils Terrain at depths of less than 1,040 feet beneath the Columbia River Basalt. All of the holes were dry.

Table 3-4
Oil and Gas Leases in Northern Idaho—Drill Holes

		Location					Total	
Date	**Section**	**Township**	**Range**	**County**	**Operator**	**Well Name**	**Depth (feet)**	**Results**
1923	35	36N	4W	Nez Perce	Unknown	Geo King Farm	1,040	Dry hole
1928	NW 31	52N	4W	Kootenai	Coeur d'Alene Oil and Devel.	Rathdrum	Unspecified	Dry hole
1929	1	51N	4W	Kootenai	Coeur d'Alene Oil and Devel.	Hayden Lake	1,980	Dry hole
1974	12	33N	1W	Lewis	Gasco	No. 1	150	Dry hole
1982	NE26	34N	1E	Lewis	Gascome	Gascome-Gasco Cottonwood 1-26	Unspecified	Dry hole

Source: Idaho Geological Survey 1984

There are no active oil and gas leases within the planning area. The lack of region-wide or local seismic surveys by private industry and the unsuccessful oil/gas well drilling in the past would indicate that this region in northern Idaho holds little interest for oil/gas exploration.

3.1.5 Other Leasable Minerals

Other minerals that are included in the leasable category by the Mineral Leasing Act of 1920, as amended, include phosphate, sodium, sulfur, and asphalt.

No significant occurrences of any of these leasable minerals have been identified within the planning area. According to the Boise office of the BLM, there are no mineral leases for any of the standard leasable mineral as of November 15, 2004, anywhere within the planning area.

3.1.6 Acquired Lands—Leasable Minerals

Through the Acquired Lands Leasing Act of 1947 (61 Stat. 913: 30 USC 351), the BLM issues prospecting permits and leases on lands that are acquired by the federal government under special circumstances, such as purchase, condemnation, or donation from a private owner. If minerals are acquired with the title, then they are available from the federal government. This includes the standard leasable minerals, such as coal, phosphate, potassium, sulphur, or oil shale leases, as well as the locatable (hard rock and other) minerals. Mineral locations are not permitted on acquired lands. Acquired lands leases can only be issued with the approval of the management agency having jurisdiction over the lands.

Although the BLM is responsible for issuing prospecting permits and mineral leases on acquired lands, decisions regarding surface management resides with other agencies having authority over the surface of the lands in question. Acquired land leases can be issued only with the approval of the surface management agency, such as the US Forest Service or others, having jurisdiction over the lands. Historically the three commodities involved in acquired land leases include garnet, clay, and gold.

Currently there are eight active leases, totaling 2,237.14 acres. The inactive-closed case leases include 41 leases, involving 23,846.84 acres, which cover a variety of minerals, including garnet, gold, clay, limestone, uranium, feldspar, mica, and silica **(Table 3-2).** Historically, the three major acquired lands lease commodities were for garnets in the Emerald Creek District, clay in the nearby Bovill District, and both placer and lode gold throughout Idaho and Clearwater Counties. Just to the north and east there are additional acquired land leases as extensions within Shoshone and Benewah Counties. This active and historic mining area overlaps the boundary between the planning areas of the BLM's Coeur d'Alene and Cottonwood Field Offices because of the similar geological conditions and continuity of mineral development. Extensive acquired lands are present within the Emerald Creek area, which are likely to be leased in the future, based on the past level of lease activity in the area.

Under most circumstances the garnets are considered to be locatable minerals, but in this special acquired lands circumstance they are leasable only. Clay is considered a saleable commodity if it is of a common variety; otherwise it is locatable if it has properties that makes it an uncommon variety.

3.2 LOCATABLE MINERALS

The General Mining Law of 1872 (30 USC Sec.22) states that "Except as otherwise provided, all valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, shall be free and open to exploration and purchase…."

The Federal Regulations 43 CFR 3812.1 defines a locatable mineral as "Whatever is recognized as a mineral by the standard authorities whether metallic or other substance, when found in public land in quantity and quality sufficient to render the lands valuable on account thereof, is treated as coming within the purview of the mining laws."

There is no such thing as a list of locatable minerals because of the requirement for value that depends on a number of factors, such as quality, quantity, minability, demand, marketability, environmental protection, and reclamation. Locatable minerals include the following:

- All "valuable mineral deposits," defined under the 1872 mining law;
- Uncommon varieties of sand, stone, gravel, cinder, pumice, and pumicite; and
- Except those specifically excluded by the acts outlined below.

The following acts have changed the General Mining Law of 1872:

- The Mineral Leasing Act of 1920 (41 Stat. 437);
- The Materials Act of 1947 (61 Stat. 681);
- The Acquired Lands Leasing Act of 1947 (61 Stat. 913; 30 USC 351);
- The Act of July 23, 1955 (69 Stat 367), which removed common varieties of sand, gravel, cinders, pumice, or pumicite from locatable minerals and placed them under the Materials Act as salable minerals; and
- The Geothermal Steam Act of 1970 (84 Stat. 1566).

Maps of the statewide distribution of mineral commodities are included in **Appendix E,** which was prepared for an assessment of mineral and water resources in Idaho (US Geological Survey 1964).

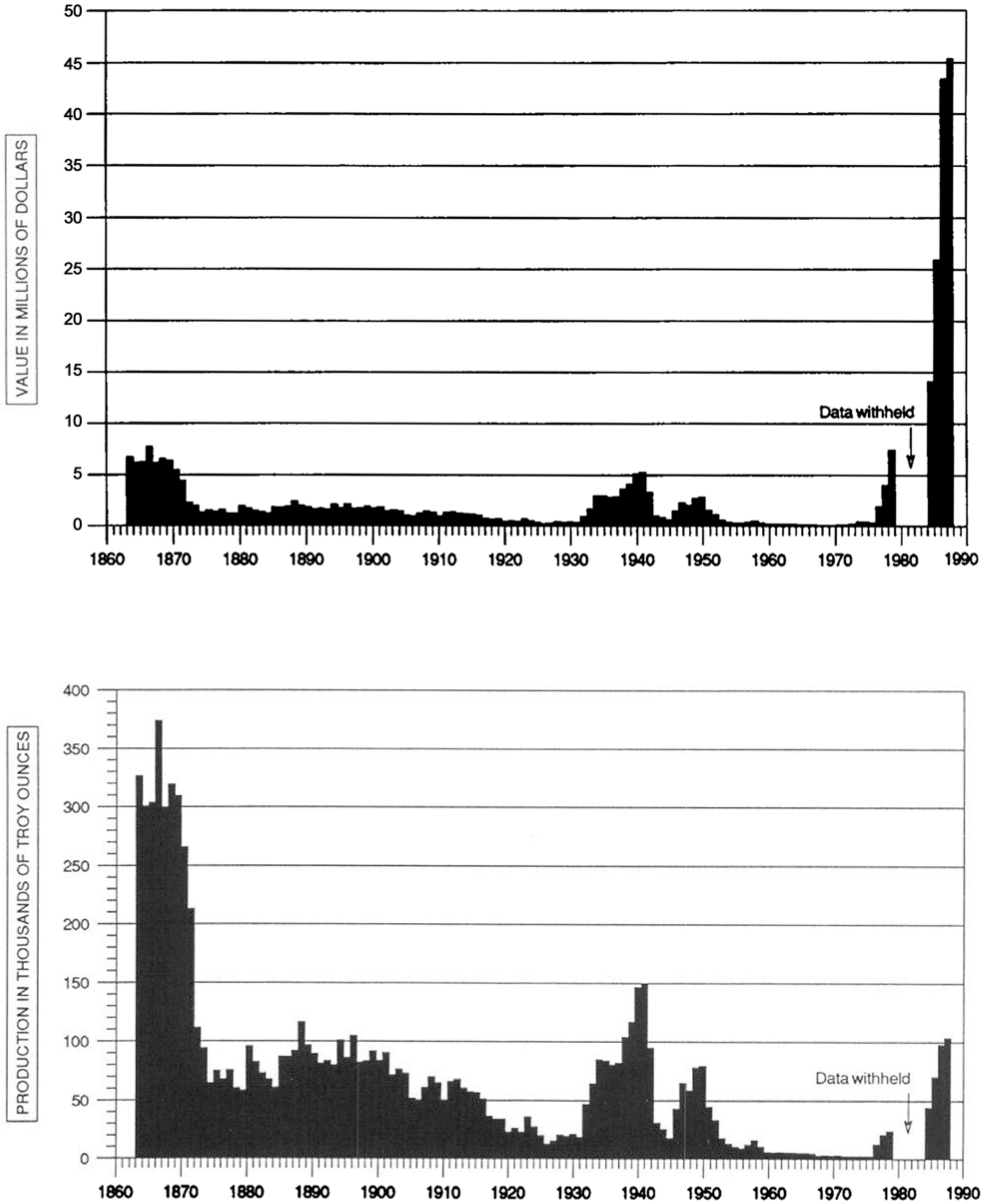
3.2.1 Gold

The initial discovery of gold in 1860 near Pierce, Idaho, resulted in the establishment of mining as Idaho's first industry. It provided employment, altered jurisdictional boundaries, shaped politics, and helped establish the Idaho Territory in 1863 and ultimately its designation as a state. Following the first discoveries, Idaho prospectors spread throughout the state and found deposits of gold in even the most remote localities. Placer mining was the main source of gold in Idaho during the late 1800s due to the ease of recovery, minimal equipment required, low investment, and high grade material on the surface. As time progressed, the search broadened in scope for the lode gold deposits that were the ultimate source of the placers. This resulted in the discovery of individual gold mines and gold mining districts throughout the state, which increased and expanded the gold mining industry through the early part of the 1900s. During the depression of the 1930s gold mining enjoyed a second boom due to an increase in the price of gold from $20.67 per ounce to $35 per ounce in 1933, with production increasing to significant levels. The onset of World War II and the imposition of WPB Order L-208 forced the closure of the gold mines. Sharply increased costs after the war resulted in few mines reopening. Removal of the federal government fixed price of gold in the 1970s and consequent increase above $100 per ounce caused a reemergence of the gold mining industry. Modern exploration, technology, and development since the 1980s has resulted in an active mining industry, with well-financed mining companies developing low grade/high tonnage deposits and individual small prospectors searching for high-grade veins. In addition, small operators are continually searching for and attempting to develop high grade/low tonnage deposits in the historic districts that can be operated with a small labor force, limited capitol, and minor surface impact.

Idaho ranks ninth in total gold production among the states, with a total of about 8.3 million ounces from 1863 to 1962 during the historical period of gold mining in the state (US Geological Survey 1964). The modern era (1992 to 2003) production totals about 1.4 million ounces of gold (US Geological Survey 2004), primarily from a few large open pit gold mines, including the De Lamar, Beartrack, Grouse Creek, Stibnite, and Blackpine mines, all located outside the planning area. Mining from several small operations, including placer and individual lode mines, may have produced a few thousand ounces of gold at the most. The amount and value of the gold production in Idaho from 1860 to 1988 is shown in **Figure 3-4**. In 1995 a new state production record of 300,000 ounces of gold was reached from six new mines (US Geological Survey 2004). However, by 2000 none of the gold mines were in operation, having closed down due to low metal prices and exhaustion of reserves. Again in 2004 the gold price rise to over $400 per ounce has stimulated new interest in gold exploration, with over fourteen active exploration projects within the state.

This historical review indicates the variability of the production of gold industry due to a variety of factors. Future interest in the gold mining industry depends on the gold price and the environmental/political factors that influence the extractive mineral industry. Access to federal lands is critical to the future interest in exploring and developing gold deposits in the state.

The types of gold deposits in Idaho include fissure veins, replacement or disseminated deposits, and placers.



Source: U.S.Bur Mines, 1988, Availability of Federally Owned Minerals for Exploration and Development in Western States: Idaho, 1988, Special Report 3

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Gold Value and Production in Idaho, 1863-1988

U.S. Department of the Interior
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Figure 3-4

Fissure veins—In this category are open-spaced filling, breccia zones, and mineralized shear zones that are formed by ascending hydrothermal solutions filling preexisting open spaces, such as fractures, faults, and joints. Usually these are singular veins or a cluster of veins with a common direction, but in some circumstances extensive fracturing along a prominent shear zone may create a large area containing low-grade gold mineralization that can be mined on a large open pit scale. Common ore mineral of these types of deposits include, pyrite, chalcopyrite, galena, sphalerite, arsenopyrite, stibnite, cinnabar, scheelite, and silver sulfosalts. The principal gangue minerals include quartz, chalcedony, calcite, barite, and siderite.

Replacement deposits—Ore deposits within this category include contact metasomatic deposits and massive sulfide replacement bodies. Mineralizing solutions emanating from a local intrusion may encounter reactive host rocks of carbonates, shale, or arkosic sandstones. These rocks may be converted to a skarn or altered rock containing significant irregularly shaped mineral deposits containing pyrite, chalcopyrite, galena, sphalerite, pyrrhotite, magnetite, arsenides, and sulfosalts. The gangue material consists of a complex assemblage of lime silicate minerals.

Placer deposits—Gold placers represent accumulation in sand and gravel, where gold has been separated from its host rock and concentrated by gravity through the action of moving water. Black-sand deposits contain a variety of other minerals, in addition to gold, including magnetite, garnet, illmenite, monazite, niobium, columbium, tantalum, yttrium, zirconium, hafnium, uranium, thorium, and rare earths (Savage 1961).

Gold-producing areas in the Cottonwood planning area are outlined in **Table 3-5**. The Murray District, which is in Shoshone County and is part of the Coeur d'Alene or Silver Valley Mining District, is included in the table because of its proximity to the Cottonwood planning area and because of the geological similarities to gold-producing areas in the Cottonwood planning area.

Exploration and development for gold deposits can be expected to vary considerably in the planning area as the price rises or falls and companies or individuals make the commitment to search for this commodity. The geological terrain for gold throughout the planning area is considered to be prospective, particularly in old mining districts or prospects where gold has been discovered in the past.

There are two gold mining districts where the BLM has substantial blocks of land, the Elk City Mining District and the Marshall Lake Mining District. Elsewhere only a few isolated blocks of BLM land are present. These two mining districts are discussed in detail below.

Table 3-5
Gold-Producing District of Northern Idaho

County	District	Amount Gold Production (ounces)	Type of Occurrence	Remarks
Clearwater	Pierce	385,000 - placer	Gold placers in stream channels and high terrace gravels. Lodes are quartz-pyrite fissure fillings in and near pegmatite, aplite, and diabase dikes.	Earliest discovery of gold of consequence in Idaho. Early days most productive.
Idaho	Buffalo Hump	27,000 - lode	Gold-bearing fissure veins in meta-sediments of the Precambrian Belt Series intruded by quartz monzonite of the Idaho Batholith.	Activity early 1900s.
	Elk City	<500,000 - placer	Placer in Tertiary high gravels, lodes in quartz fissure veins in Belt Series, high grade metamorphics near quartz monzonite of the Idaho Batholith.	Richest placer worked out before 1872.
	Dixie	<40,000 - placer	Placers in Tertiary gravels. Lodes in quartz-pyrite veins.	Placer most productive in the 1870s.
	French Creek Florence	<1,000,000 - placer	Rich placers in stream gravels	One of the richest placers in Idaho.
	Orogrande	32,000 - lode	Gold/pyrite disseminated in shear zone in schist of Belt Series and as stringer in Tertiary granitic plutons.	
	Riggins	38,000 - placers	Placers in high bench and stream gravels.	High bench gravels most productive.
	Tenmile	111,000 - placer 36,000 - lode	Placers in gravels of Newsome Creek. Quartz-sulfide veins in gneiss of the Belt Series and quartz monzonite of the Idaho Batholith.	Placer mining early, lodes more important in later time.
	Warren-Marshall	<900,000 - placer	Placer in unconsolidated gravels, and Recent alluvium, bench, and high meadow deposits. Quartz-sulfide vein in Idaho Batholith.	Most production prior to 1900.
Latah	Hoodoo	>17,000 - placer	Placers along Palouse River and Hoodoo Creek.	
Shoshone	Murray	<439,000 - placer and lode	Gold-bearing sulfide veins in shear zones of the Prichard Fm. Rich placers worked by dredges in Prichard Creek. High terrace gravels also worked.	Most gold was from placers and gold veins. Lead-zinc veins are low in gold.

Source: US Geological Survey 1964

3.2.1.1 Elk City Mining District

This is the most significant gold mining area within the planning area, based on past production, potential for future development, and location of a significant BLM land ownership.

Both placer and lode gold operations have been important in the district since it was first discovered in 1860 by Capt. E. D. Pierce. Placer gold was discovered at Elk City and along Newsome Creek in 1861, but by 1872 it had been worked out by the methods available at that time. The first gold lode was made in 1870 but was not processed until 1902, when better access to the district became available. Nearby mining districts include the Buffalo Hump, Dixie, and Orogrande, which were developed at the same time as subsidiary districts to the Elk City Mining District. Published estimates of the value of the total gold production range from $10,000,000 to $18,500,000, but this may include initial production from these adjacent mining districts. Gold production is estimated to range from 550,000 to 800,000 ounces primarily from the rich placer deposits (Shenon and Reed 1934). Lode gold production is much lower, having been estimated to be about $725,000 (Ross 1941). Recent gold placer operation over the past two decades has been cyclical, based on the variability of the gold price.

Placer gold production has been derived from two types of deposits: high meadow gold concentrations within older alluvial and lake sediments, and reconcentration within recent stream alluvium. Extensive older unconsolidated lake and stream sediments in large flat-lying high meadows occur north and west of Elk City. These contain low-grade concentrations of gold derived from the local lode gold deposits that were formed in local lakes and streams on the weathered bedrock. Potentially large volumes of material are available, but attempts to work these areas have not been successful due to the low grades and poor recovery methods. This older lake and gravel material has been reconcentrated by local stream action, with the result that rich placer deposits were developed in Buffalo Creek, Little Elk Creek, Red Horse Creek, and Segal Gulch. These rich placers were extensively mined during the early years of the district development but were worked out by 1872 (Ross 1941).

There are several lode mines in the district that have only limited production. Most of the lode deposits are derived from quartz lenses of relatively small extent with widths of a few inches or feet, up to a maximum thickness of 20 feet. The strike length of the deposits is rarely more than 300 feet long, with mining extending to a few hundred feet in depth. There is no major fault system with extensive fracturing but rather a series of smaller gash veins separated by unaltered and unmineralized wall rock material. These are developed as a radiating system generally striking northeasterly or northwesterly within schist and gneiss along the margins of quartz monzonite Idaho batholith intrusive. These quartz fissure veins are polymetallic, containing minor pyrite, tetrahedrite, sphalerite, chalcopyrite, and galena. Depth of oxidation is minimal, with nearly all of the surface enrichment mined out in the early days of operation.

The potential for developing a large tonnage low-grade lode gold deposit is considered to be limited based on the lack of major fracturing or faulting, limited alteration halos surrounding the veins, and nonreactive metamorphic rocks within the district. There is a moderate possibility of the discovery of high grade/low tonnage deposits similar to the type of gold vein systems and smaller placer deposits that have been developed in the past. Evaluation of placer gold potential is more difficult due to a lack of site-specific data, but the low-grade high meadow material northwest of Elk City may contain a large volume of material for future high volume operations. There are a large number of potential problems associated with the development of a high meadow placer deposit, including environmental concerns, wetland issues, endangered species impact, and the low grade of the gold-bearing material. Smaller operators will probably continue to examine and develop local placer or lode gold operations within the area, which may affect the surrounding BLM land.

The BLM has nearly 27 sections of land surrounding private patented mining claims and state land blocks within the Elk City District. These are in the heart of the district and would be affected by future mining development. There are four active BLM operating plans **(Table 3-1)** within the Elk City Mining District that are in the reclamation stage or pending approval.

3.2.1.2 Marshall Lake Mining District

The small Marshall Lake Mining District produced placer gold early in its history and was followed by limited lode gold development. The record of the early production is merged with that of the nearby Warren Mining District and cannot be accurately determined. Production from the Burgdorf-Warren Mining District totaled approximately 906,500 ounces of gold, mostly from placer deposits at Warren Meadows, along the Secesh River meadows, Ruby Meadows and Lake Creek.

The lode production at the Marshall Lake District was initiated around 1902 with about $289,000 credited to the Holt/Golden Anchor Mine and the Sherman/Howe Mine between 1900 and 1928. Only minor production occurred after that date. Acquisition and consolidation of the main mines in the district by the Kimberly Gold Mines, Inc., in 2002 resulted in rehabilitation of the old mine workings, combined with underground and surface sampling. An inferred resource of approximately 145,578 tons, with an average grade of 0.66 ounces per ton gold and 2.4 ounces per ton silver, has been calculated by Kimberly Gold Mines, Inc. (Kimberly Gold Mines, Inc. 2003). Gold occurs both in a free state and with sulfides, which necessitates a combined gravity and flotation mill circuit. A 100-ton-per-day mill remains on the property from the early day development and would require rehabilitation. Another company, Manchu Enterprises, Inc., continues to evaluate the gold vein potential on the east side of Marshall Mountain.

Most of the known lodes in the district are developed within a large roof pendent of schistose Belt Series rocks in the Idaho Batholith. These lodes in the district are relatively narrow, generally only a few inches to a few feet wide, and have strike lengths of a few thousand feet. The ore zones are polymetallic quartz veins containing gold, argentiferous tetrahedrite, chalcopyrite, pyrite, sphalerite, and galena. Surface oxidation is minimal, with no significant secondary enrichment of gold or silver values. There are no major structures concentrating the vein systems; rather, they appear to form as short peripheral gash veins in the metamorphic envelope on the margin of the granitic intrusive.

The potential for development of a large tonnage-low grade deposit appears to be minimal, based on the historic minor production, limited extent of the vein systems, lack of significant alteration halos around the veins, and nonreactive host rocks. The best opportunity for gold development is related to the small high-grade vein systems that have been the primary resource mined in the past. The critical location of the mining district adjacent to the Gospel Hump Wilderness Area and the Wild and Scenic Salmon River Corridor is another factor that militates against future development. Small underground mine development with minimal surface impact may be possible if an economic resource can be identified; however, disposition of the mill tailing is a significant problem in the steep topography extending downward to the Salmon River.

The BLM holds approximately 50 percent of a township (T25N, R5E) in the center of the district that surrounds a number of patented mining claims and one state section. There are four active operating permits totaling eight acres within the Marshall Lake Mining District that include three reclamation cases and one pending permit. The mines are within one to two miles of the Wild and Scenic Salmon River Corridor and about one mile from the boundary of the Gospel Hump Wilderness Area. Any mineral development would have to address the issues and regulations related to the close proximity to the wilderness boundaries.

3.2.1.3 Other gold mining districts

Placer deposits are the primary source of gold production in most of the other gold mining districts within the planning area. Minor polymetallic gold veins similar to the Elk City or Marshall Lake Mining Districts are noted, but the lode production in these other districts has been minimal.

The Pierce Mining District was the site of the initial gold discovery (1861) within the state, with significant development along Orofino Creek, Lolo Creek, and Musselshell Creek in Clearwater County. Placer production is estimated at 385,000 ounces of gold, valued at $10 million, primarily from high terrace gravels and alluvial material. Only minor lode production ($250,000) is reported from fissure-filling quartz veins in or near pegmatite, aplite, and dikes cutting the Idaho Batholith (Ross 1941).

Along tributaries to the north fork of the Clearwater River there are a number of smaller placer gold streams that have had minor production. These include the Cedar Creek and Dick Creek Placers and the lodes at the Dewey and Jerico Mountain Mines. Production has been so low that none is recorded for these areas. Black sand deposits containing monazite and other heavy minerals are identified (Savage 1961).

Near Lowell on the middle fork of the Clearwater River, there has been minor gold production but none recorded. No lode gold production is mentioned for this area, but monazite-bearing black-sand is present (Savage 1961).

The south fork of the Clearwater River west of Elk City has had moderate placer development from the larger tributaries that include the Newsome-Tenmile District. Placer production from the Newsome-Tenmile District is estimated to be $2 million, with another $170,000 allocated to the lode mines (Ross 1941). Geological conditions are similar to the Elk City District, with extensive high meadow with reconcentration by recent stream activity.

The Florence-French Creek Mining District was one of the richest early day high-grade placer districts developed with recorded placer production of over one million ounces (Ross 1941). These were developed in high meadow terrain, with sand and gravel of minimal thickness but significant gold content. No significant lode production has been recorded from the district. The geology is similar to the Elk City District, with small quartz veins located in schistose units near intrusive granite of the Idaho Batholith.

The Simpson Mining District includes the Salmon River, which extends from Freedom west to Riggins and north to Whitebird. It includes all the placer development along this main stretch of the Salmon River. A relatively minor amount of gold (38,000 ounces) is credited to this district (Ross 1941), but it was never noted as a significant high grade producer as compared to other districts in the region, such as Florence, Pierce, Burgdorf-Warren, or Elk City. Most of the placer gold has been recovered from high bench terrace deposits perched above the main river (Ross 1941). Currently, intermittent placer gold mining occurs along the higher bench gravels, located along the Salmon River between Riggins and Whitebird. These are operated by individuals, small private mining companies, or by smaller publicly traded companies that rely on the Canadian or US equities market to raise exploration and operating funds. Always a consideration in these operations are financial stability, resource evaluation, engineering mine design, environmental protection, reclamation bonding, and longevity of operations.

Three BLM operating permits that are currently inactive are situated on high terrace material along the river between Riggins and Lucille **(Table 3-1).** A patchwork of BLM land is present along the Snake River in the Simpson Mining District, from Riggins to Whitebird. Currently the area is designated as a Wild and Scenic River Corridor.

In the Lower Salmon River downstream below Whitebird there does not appear to be any significant historical placer gold production. This may be related to the distance from the projected primary source area in the Salmon River Canyon and dilution of material by the erosion of the Columbia River basalts and other nonmineralized units in the vicinity. There are irregular discontinuous blocks of BLM land along the lower Salmon River in this area. The area is designated as a Wild and Scenic River Corridor.

Lode copper-gold-silver is found in the Deer Creek Mining District, a tributary of the lower Snake River in Nez Perce County. Due to the insignificant production no record remains of the history of the district. Mineralization is developed in crushed sulfide-bearing fissure zones within greenstone of the Wallowa-Seven Devils Terrain (Hubbard 1956). There is a significant amount of BLM land throughout this area, where there are both metallic and nonmetallic limestone prospects.

In the Harpster District, located east of Grangeville along the south fork of the Clearwater River, gash veins containing some gold are present in a quartz diorite intrusive. Nearby a wide silicified shear zone containing copper and significant high gold seams has minor unrecorded production (Ross 1941). Within the past decade this zone has been explored by drilling as a potential bulk tonnage-low grade gold deposit by a number of major mining companies, but results appear to be subeconomic.

The Hoodoo District in northern Latah County was a minor producer of gold from lode deposits of fissure quartz veins and disseminated chalcopyrite in schistose units adjacent to the Thatuna granodiorite. Minor placer gold is also present, with about 17,000 ounces of gold credited to this district (Hubbard 1957). Previously there was acquired lease land within the area as a BLM lease (#032641) for gold covering 56.62 acres, but it was closed out in 2000.

3.2.2 Silver, Lead, and Zinc

Silver, lead, and zinc are closely associated geologically in Idaho and are usually found together in the same mineral deposit and so are discussed together in this report. Production and value of the silver-lead-zinc mines throughout Idaho is shown in **Figure 3-5 (Silver)** and **Figure 3-6 (Lead-Zinc)** (Hyndman 1988). The graph reflects the variation in the silver price and the impact of new mines on production, primarily in the Coeur d'Alene Mining District.

Most of the mineral deposits in the planning area are represented by polymetallic fissure veins containing gold as the primary constituent with minor silver, lead, zinc and or copper in the veins. The principal types of deposits are classified into the following four categories:

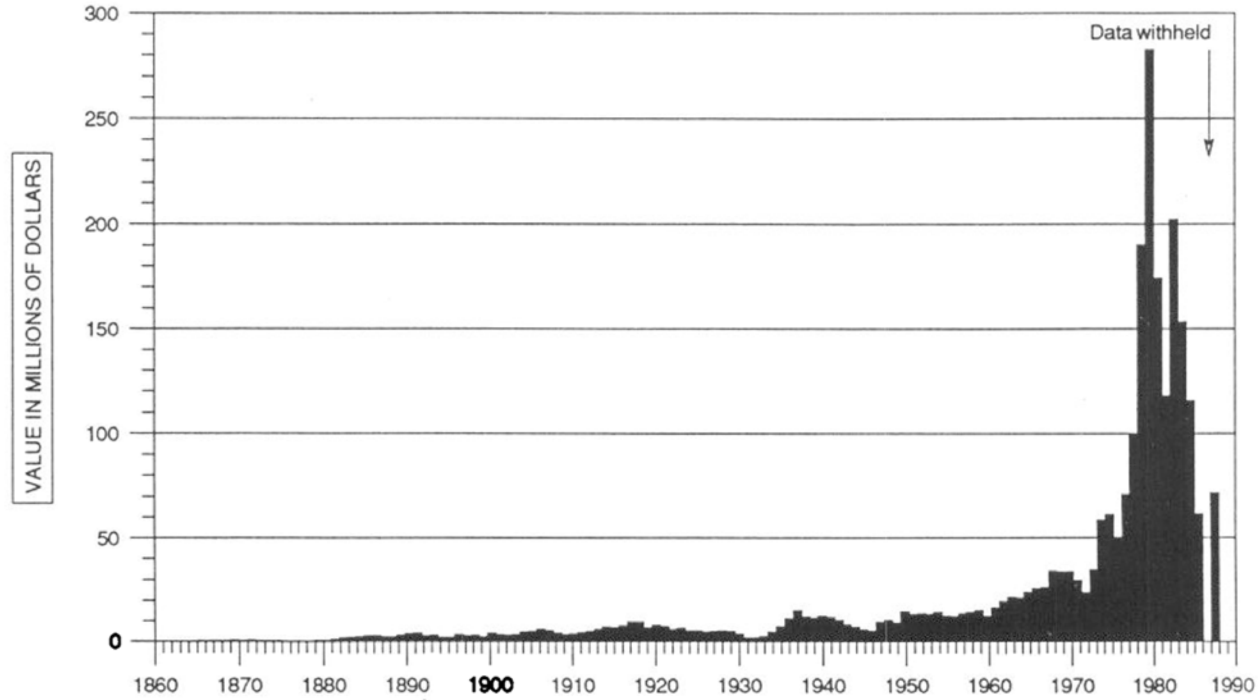
- Polymetallic veins;
- Replacement deposits in metamorphic rocks adjacent to the Idaho Batholith;
- Precious metal fissure veins with gold/silver values; and
- Contact metamorphic deposits.

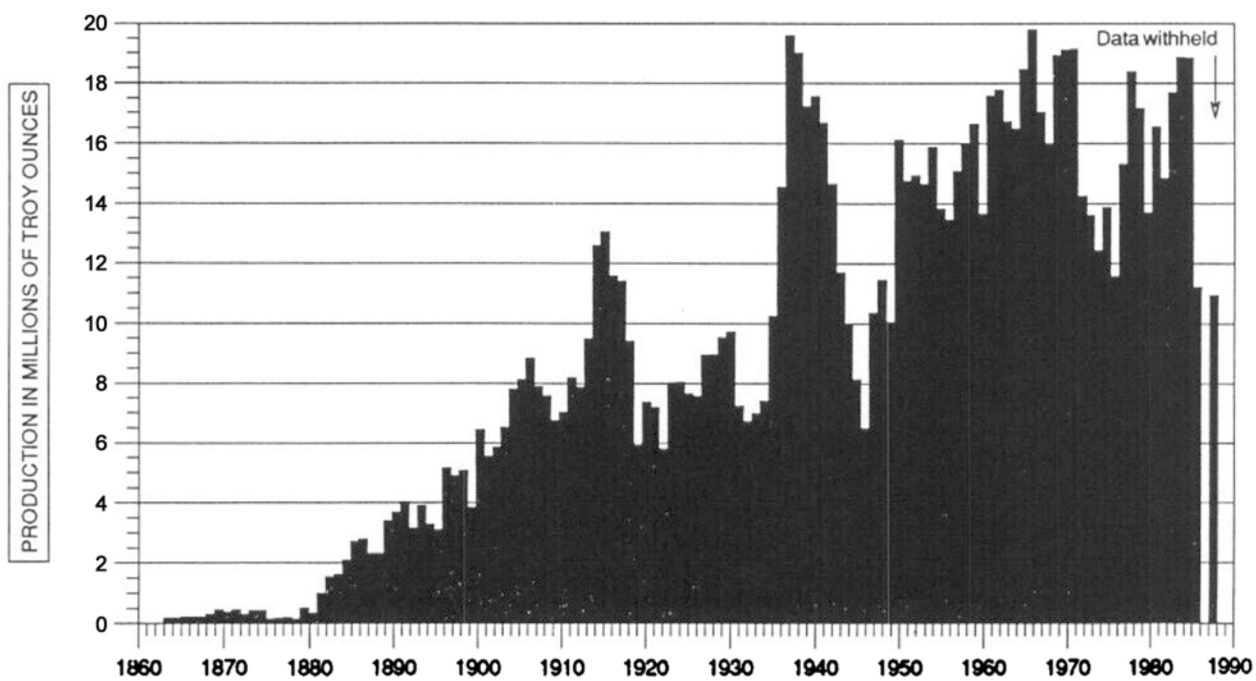
Polymetallic veins of silver/lead/zinc/copper are located throughout the planning area and are outlined in **Table 3-6.** Erosion and weathering of these small polymetallic veins is considered to be the primary source for the more extensive placer gold deposit found throughout the region. These polymetallic veins were mined primarily for the gold values. Primary silver values are low and could only be mined in conjunction with the economic gold content. There are no significant zones of secondary silver enrichment, as is the case in other districts throughout the state, such as the Silver City District. The zone of oxidation is generally less than a few tens of feet due to the widespread glaciation developed in the high central Idaho mountains where most of these deposits are located. There are no deposits or prospects resembling the significant Coeur d'Alene Mining District within the planning area, due to the different geologic conditions that prevail in central Idaho.

Table 3-6
Silver, Lead, and Zinc-Producing Districts in Northern Idaho

County	District	Type of Occurrence
Idaho	Elk City	Veins in Precambrian? Schist and gneiss near contact with the Idaho Batholith.
	Florence	Veins in granitic rock of the Idaho Batholith.
	Marshall Lake	Veins in Precambrian schist and gneiss near the contact with the Idaho Batholith.
	Warren	Veins in granitic rock of the Idaho Batholith.

Source: US Geological Survey 1964





Source: U.S. Bur Mines, 1988, Availability of Federally Owned MInerals for Exploration and Development in Western States: Idaho 1988, Special Report

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Silver Value and Production in Idaho, 1863-1988

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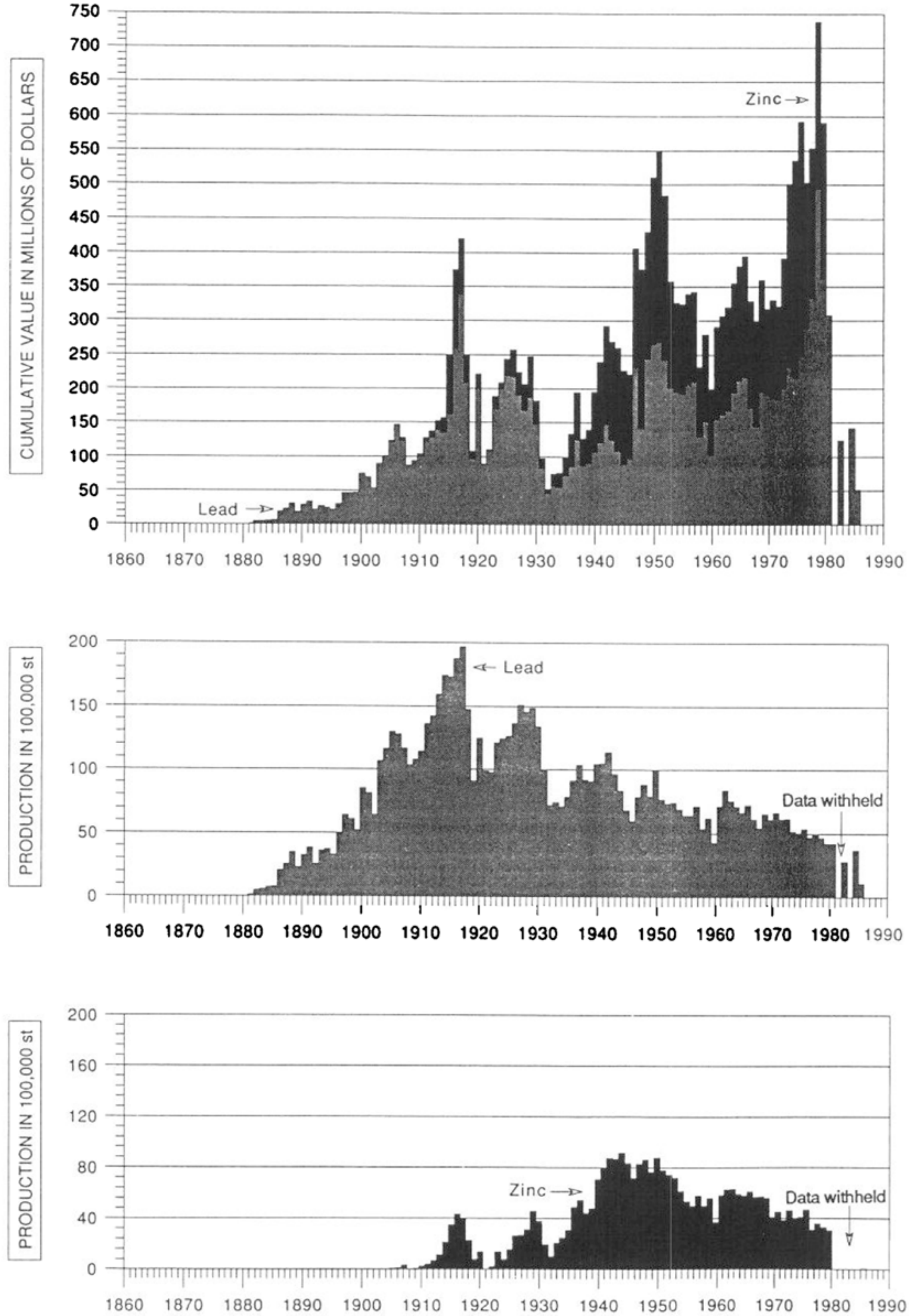
Figure 3-5



Source: U.S. Bur Mines, 1988, Availability of Federally Owned MInerals for Exploration and Devlopment in Western States: Idaho 1988, Special Report

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No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of this data for individual or aggreagate use with other data.

Lead and Zinc Value and Production in Idaho, 1863-1988

Figure 3-6

3.2.3 Strategic Minerals

Strategic minerals are those "commodities essential to the national defense for the supply of which during war, we are wholly dependent or in part dependent upon sources outside of the national boundaries of the United States, and for which strict measures controlling conservation and distribution are necessary." Definition of critical minerals is somewhat different from that for strategic minerals, although the two categories are often considered together. Critical minerals are those essential to the national defense, the procurement of which "in war, while difficult, is less serious than those of strategic minerals because they can either be domestically produced or obtained in more adequate quantities from reliable foreign sources and for which some conservation measures may be necessary for non-defense uses." It follows that a Strategic mineral is one in which a domestic shortage exists. On the other hand potentially economic reserves of critical minerals may be relatively abundant within the United States, but for social, economic, environmental, or political reasons the country relies heavily on foreign sources of the raw ores.

The 1975 Conference on Strategic and Critical Minerals listed 29 "critical" minerals, of which 19 were designated "strategic." These strategic commodities include optical mica, niobium, cesium, tantalum, bauxite, manganese, cobalt, platinum group minerals, asbestos, chromium, tin, fluorine, nickel, mercury, tungsten, antimony, selenium, beryllium, and thorium.

Idaho has twelve of these commodities in variable concentrations throughout the state. While not all of these may be within the planning area, the geological conditions or rock types may be favorable for their presence and future discovery.

3.2.3.1 Beryllium

Beryllium is an uncommon light metal that has a wide variety of uses both as a pure or alloyed metal. The mineral beryl contains 10 to 14 percent BeO and is obtained from pegmatites in granitic intrusions. Idaho is well endowed with pegmatites containing beryl, and in addition there are a few nonpegmatite sources, such as dissemination within granitic intrusives.

The only beryllium occurrence within the planning area is in the Avon District of Latah County. It is associated with an extensive zone of pegmatites in the Thatuna granite that contain the accessory minerals mica, feldspar, tourmaline, graphite, garnet, beryl, and minor amounts of uranium minerals. It has been recovered from mica mining, and it is estimated that about 100 pounds of beryl have been produced (US Geological Survey 1964).

Pegmatite phases associated with the Idaho Batholith occur throughout the region, and undoubtedly some of these contain beryl minerals, but none has been identified to date.

Two acquired lands leases in Section 22 and 27, T41N, R02W cover an area with a reported beryl occurrence on the south side of Mica Mountain, Latah County. These leases were for feldspar and mica, and the case was closed in 1993. Acquired BLM lease lands cover some of the area of interest.

3.2.3.2 Cobalt and Nickel

Cobalt occurs in many different forms but primarily as cobaltite. It is often associated with nickel, but no nickel has been reported from any of the occurrences in Idaho.

The primary occurrence of cobalt in Idaho is outside the planning area at the Blackbird Mine, Lemhi County. There it is developed as a copper-cobalt stratabound deposit within high-grade metamorphics of Precambrian age. These are a unique sequence of rocks that form under special geological conditions, none of which are identified within the planning area.

The lack of mineral occurrences or prospects and unfavorable geological conditions renders the potential for cobalt-nickel-copper deposits as being very low.

3.2.3.3 Manganese

Manganese occurs in a wide variety of minerals, often as a nonmineral segregate in deeply weathered sedimentary rocks. Idaho is not a large manganese-producing state and has very few occurrences or prospects.

Many base and precious metal deposits contain primary manganese-bearing minerals, such as rhodochrosite or manganiferous siderite, which are oxidized to a black stain in the surface environment. These manganese-bearing gangue minerals are not present in the planning area.

No manganese production has been recorded in the planning area. The possibility of significant production of manganese in the region is low to due a lack of prospects and unfavorable geology.

3.2.3.4 Niobium and Tantalum

Niobium and tantalum do not occur in nature as free metals but are found as constituents of other minerals that are compounds of a number of different elements. The most important ore minerals are columbite-tantalite, pyrochlore, microlite, and euxenite (US Geological Survey 1964).

Some granite bodies contain elevated amounts of disseminated columbite-tantalite that have been concentrated by weathering and fluvial processes to produce placer deposits. Usually niobium/tantalum is produced as a byproduct of other minerals, such as monazite in black-sand deposits, and is associated with a number of heavy minerals commonly found in black-sand deposits, including euxenite, sphene, rutile, illmenite, and magnetite.

At one time Idaho was the largest producer of niobium and tantalum in the United States, primarily from the Bear Valley Placer Deposit, Valley County. Mining began in 1955 and produced over one million pounds of 90 percent niobium-tantalum pentoxide under US government contract. Mining continued until 1959, when it ceased with fulfillment of the government contract. Without stockpile subsidies it was not profitable to continue mining, and it has remained inactive since then. It is currently under reclamation efforts by the state and federal government.

Within the planning area niobium/tantalum has been reported within some of the black-sand placers along the Clearwater River, the Elk City placers, and the Burgdorf-Warren District (Savage 1961).

Placers in the Elk City area represent accumulations in a number of different geological environments (Savage 1961), as described below.

High Level Basin Gravels and Lake Deposits

These are Tertiary high meadow gravels developed in relation to the development of a high level erosion surface that formed a relatively flat planar topographic feature across the Idaho Batholith and associated metamorphic rocks. High meadow deposits of this type are found in the Elk City District, the Florence District, and Burgdorf-Warren District, where they contain low-grade gold and black-sand concentrated in the basal sand and gravel material and to a lesser degree in the overlying lacustrine sediments.

Bench or Terrace Gravels

Early Pleistocene bench or terrace gravels were formed as erosion and began cutting through the old high-level erosion surface and reconcentrated the heavy black-sand material along the existing rivers. Downcutting and erosion by the current rivers have left isolated remnants of terrace gravels stranded a few tens to hundreds of feet above the main rivers. Examples of these deposits are found along the north fork and south forks of the Clearwater River and several of the larger tributaries, such as Orofino Creek or Lolo Creek.

Glacio-Fluvial Sand and Gravel

Late Pleistocene fluvial and glacio-fluvial sand and gravel was deposited within the current river. The black-sand material from the two previous erosion cycles was reconcentrated with enrichment of gold and black-sand minerals. This material lines the banks and rivers of the main drainages, such as the Clearwater River and its tributaries.

Recent Alluvium and Floodplain Deposits

The final cycle is the recent alluvial and associated floodplain deposits developed in and along the current river beds. Many of the small drainages of the major river systems contain material eroded and concentrated from the previous cycles. The strongest black-sand concentrations should be found in sand and gravel placers, which represent more than one cycle of erosion where winnowing of the prior mineral grains concentrated the heavy mineral grains. The middle and north forks of the Clearwater River are deeply incised and have no high-level meadow features more prominent to the south. These rivers contain bench or terrace gravels along their upper levels and recent alluvium and floodplain deposits along their lower reaches. Examination of the black-sand deposits has been minimal, with only a cursory investigation of the type of black-sand minerals present. Monazite-bearing black-sand in Musselshell Creek also contained illmenite, magnetite, garnet, and zircon. Although radioactive black-sand was reported in the Clearwater drainages, none has been discovered in the latest study (Savage 1961). Other localities where monazite-bearing black-sands were identified include the following:

- Orogrande Creek, northeast of Pierce;
- North fork of the Clearwater River;
- Elk Creek, from Elk River downstream to the north fork of the Clearwater River;
- Rhodes Creek east of Pierce; and
- Lochsa and Selway Rivers.

The south fork of the Clearwater River contains important concentrations of black-sand material in the Elk Creek District and associated Dixie Mining District, the Tenmile-Newsome District, and along the main Clearwater River drainage. In the Elk City, Dixie, and Tenmile-Newsome Districts extensive gravel and lake sediments form high meadows developed on the high-level erosion surface. There appear to be relatively large volumes of material that could contain valuable minerals. The presence of radioactive black-sand distinguishes this area from those in the north fork of the Clearwater River. Quantitative information concerning the grade or distribution of the black-sand material is minimal (Savage 1961).

The Florence District north of the Salmon River was one of the primary placer gold concentrations within the area and may contain significant black-sand deposits. The district has been described as “a marsh on top of a mountain” because of the relatively flat meadow-like topography that covers a large area at an elevation of about 7,000 feet. This older Tertiary high-level erosion surface underlies the meadow area where the historic placer mining took place. Minerals in the black-sands include monazite, zircon, and radioactive allanite. After extensive sampling, the Idaho Mining and Milling Company in 1958 installed a jig-equipped bucket line dredge that operated for an unknown period of time. Results of the sampling and mining are not available. Potential future development problems include inaccessibility, presence of variable thickness of peat overburden in some of the placer beds, water deficiencies, grade and distribution of material, and the environmental concerns associated with proximity to the Salmon River Wild and Scenic Corridor and the Gospel Hump Wilderness Area.

The Burgdorf-Warren Mining District is noted for placer gold recovery along Warren Meadows and Secesh Meadows, which represent development on a high-level erosion surface. Heavy mineral black-sands may be panned from much of the glacio-fluvial material, where monazite and zircon are identified. Dredging in Warren Meadows has laid down the fines containing the black-sand material beneath the coarse gravel tailing that creates major problems in future mining activity. The Warren Meadows was drilled in 1950 to assess the remaining gold values and other heavy minerals. Significant monazite was recovered in the drilling. In the Secesh Meadows near Burgdorf, drilling and sampling was conducted in 1948 and showed abundant monazite and zircon. Results of the drilling indicated significant concentrations of the black-sand minerals that could be of interest. Accumulations of high concentrations of niobium-tantalum and other black-sand heavy minerals may be present in the Lake Creek-Secesh Valley, Ruby Meadow, and Warren Meadow Placers (Savage 1961).

Very limited to no BLM lands are within these potential placer mining areas. None of these occurrences have had any significant production of niobium/tantalum within the black-sand, but little information is available on the distribution or quality of these placer deposits, except as a qualitative evaluation, as outlined above.

3.2.3.5 Thorium and Rare Earths

Thorium and lanthanide series of elements, termed rare earths, have similar chemical properties and are often found in the same minerals. Thorium is radioactive but cannot be used directly in nuclear reactors; instead it must first be converted to fissionable U233 in breeder reactors and then used as a source of atomic energy. The lanthanides or rare earth series contains two groups: cerium and yttrium. Over 200 minerals are known to contain rare earths. The most important ones in Idaho are from placer deposits that recover monazite and euxenite, principally in Bear Valley, Valley County (US Geological Survey 1964).

Thorium and rare earths are distributed throughout Idaho as hydrothermal veins, within late-stage pegmatite, and as accessory grains in igneous rocks.

Concentration of these materials in heavy mineral black-sand placer deposits makes them potentially commercial. The most productive deposit in Idaho has been the monazite- and euxenite-rich placers that were mined in Bear Valley, Valley County (Savage 1961).

The potential for black-sand development containing significant monazite and thorium is impressive and may equal or exceed that of lode deposits (US Geological Survey 1964). Placers that have received partial evaluation or development include those in the Burgdorf-Warren District, Florence district, Dixie area, Elk City-Newsome area, Pierce area, and Elk River area.

The geological processes and terrain formed the niobium-tantalum heavy minerals outlined in the previous section. These minerals are usually found concentrated together in the same black-sands placer deposits. Placer deposits in the southern part of the planning area appear to have more radioactive mineral grains than those in the middle and north forks of the Clearwater area. These districts include the Elk City, Tenmile-Newsome, Florence, and Burgdorf Warren districts.

The only BLM land within the potential thorium-rare earth placer mining area is in the Elk City Mining District.

Potential development of thorium-rare earth-bearing deposits in the planning area is considered low, but this may be due to a lack of information as well as a low economic incentive at the present time.

3.2.3.6 Titanium, Zirconium, and Hafnium

The principal minerals of titanium include illmenite and rutile . Zircon may also contain significant percentages of hafnium. Most of these minerals occur as accessories in granitic rocks such as the Idaho Batholith and in the associated metamorphic rocks. Most of the commercially produced titanium and zirconium is from naturally concentrated detrital deposits concentrated by fluvial processes. These metals are commonly concentrated together within the heavy mineral black-sand of central Idaho.

The same principals of mineral concentration and location of occurrences as applied to the niobium/tantalum black-sand occurrences operate for the titanium-zirconium-hafnium minerals. These minerals are found in black-sand placers in central Idaho adjacent to the Idaho Batholith. The Hoodoo, Elk City, Tenmile-Newsome, Burgdorf-Warren, and Florence district in Idaho County are examples of these black-sand deposits (Savage 1961).

There are minor BLM lands in the potential placer mining areas.

In the Hoodoo District of northern Latah County the clay deposits yield illmenite that occurs as a residual weathering product from the margins of the Thatuna granite and peripheral metamorphics (US Geological Survey 1964).

The potential for development of these black-sand deposits is considered to be low due to the limited prospects or mines and the lack of information concerning the volume and quantity in the deposits.

3.2.4 Other Minerals

A wide variety of other minerals are present within northern Idaho, often occurring in combination with other minerals, and may be considered as a by-product rather than the primary material.

3.2.4.1 Antimony

Stibnite and tetrahedrite is the principal mineral of antimony that may occur in minor concentrations within polymetallic vein systems found throughout the planning area.

The only significant source of antimony in the state was mined at the Stibnite Mine, Valley County, as a by-product of the gold and tungsten mining that occurred during World War II. Some antimony has been identified in Deadwood Gulch near Warren and from the Kimberly Mine in the Monumental District of Idaho County, both within the gold concentrates (US Geological Survey 1964).

Potential for development of antimony is consider to be low, due to the lack of mineral occurrences.

3.2.4.2 Barite

Barite occurs as a hydrothermal product from intrusive bodies and as primary strata-bound layers in certain unique sedimentary sequences. Nearly all barite is imported from China and other foreign countries. There are no reported occurrences of barite within the planning area (US Geological Survey 1964).

No development of barite is anticipated for the area due to a lack of favorable host rocks and no mines or prospects.

3.2.4.3 Fluorspar

Fluorspar is a mineral aggregate or mass containing enough fluorite to be of commercial interest. Fluorite is the primary source of fluorspar.

Fluorite is sparingly present in some Idaho mineral deposits, where it is found as a major constituent of fissure veins, breccia veins, and other lodes, along with lesser amounts of barite, calcite, and quartz. It occurs in south and east-central Idaho, where it is associated with Tertiary plutons that have historical production such as the Meyers Cove and Bayhorse Districts. There are no reported fluorite prospects or mines within the planning area (US Geological Survey 1964).

The potential for fluorite mines is considered to be low in the planning area due to a lack of prospects or occurrences.

3.2.4.4 Garnet

Garnet is a collective term for a group of six minerals that have similar chemical and physical properties, including a prominent crystal form. Garnet is a hard, moderately heavy, and commonly dark red or reddish brown mineral that is resistant to chemical and physical breakdown and can be concentrated by weathering and erosion in placer deposits. Transparent flawless garnets, particularly if they have an attractive color, may be cut into semiprecious gemstones. They are valued by mineral collectors and the general public for recreational collecting due to their unique shape and color. Garnet is important as an industrial material, due to its hardness (7.5 to 8), sharp fracture, and abrasive character.

In Idaho, significant quantities of garnets occur in metamorphic rocks of the Belt Series and in granitic rocks of the Idaho Batholith. Although garnets were noted from placer gravels in the Lewiston area as early as 1886, the first commercial production of abrasive garnets in Idaho occurred in 1940 at a small screening and classifying operation in southeastern Benewah County. Idaho has ranked high in garnet production throughout the years and was ranked first in the US from 1992 to 2003. Most of the garnet has been mined from placer deposits in the east and west forks of Emerald Creek in Benewah and Shoshone Counties. Additional resources have been recovered from placer deposits just west of Bechtel Butte in Latah County.

In the Emerald Creek placers the source for the garnet deposits is disseminated mica schist of the Precambrian Belt Super Group. Almandine garnet is weathered from the schist and concentrated in local alluvial deposits in Emerald Creek, where it may constitute up to 20 percent by volume. Most of the garnets are less than 1/16 inch, but larger sizes up to 1 inch, with well-developed crystal faces, have been recovered, which makes them attractive for recreational prospectors. The Idaho state gemstone is the star garnet, which is found only in this Emerald Creek area and one other place in the world, Poona, India. The star garnet is unique and occurs as a component of the regular garnet placer deposits in the area. The Forest Service has operated a public recreational digging site on special reserves along #281 Gulch of Emerald Creek. Commercial operations for both industrial and recreational garnets are conducted by the Emerald Creek Mining Company, the largest garnet producer in the US.

The concentration of garnet, which is a relatively heavy mineral, is localized in black-sand deposits of central Idaho, where the Idaho Batholith formed primary garnet minerals in the roof pendants and peripheral metamorphic sequences. All black-sand occurrences in the region contain moderate to high concentrations of garnets. However, these are generally not economic because of location or environmental concerns. Another reason is the difficulty in penetrating the established garnet market that is dominated by the Emerald Creek Mining Company from the operations along Emerald Creek, Latah County. The locations of garnet in Idaho is outlined in **Figure 3-7.**

In Clearwater County, garnet is present within the black-sand placers along the north, middle, and south forks of the Clearwater River area, but information on the quality or quantity is not available. In the Burgdorf-Warren Mining District, garnets are very common in the Warren Meadows, Ruby Meadows, and Secesh Meadows placer mining areas (US Geological Survey 1964). A hundred tons of refined garnet material from the Ruby Meadows was produced in 1953. There has been no significant production of garnets from any of these placer deposits since that time (Savage 1961).

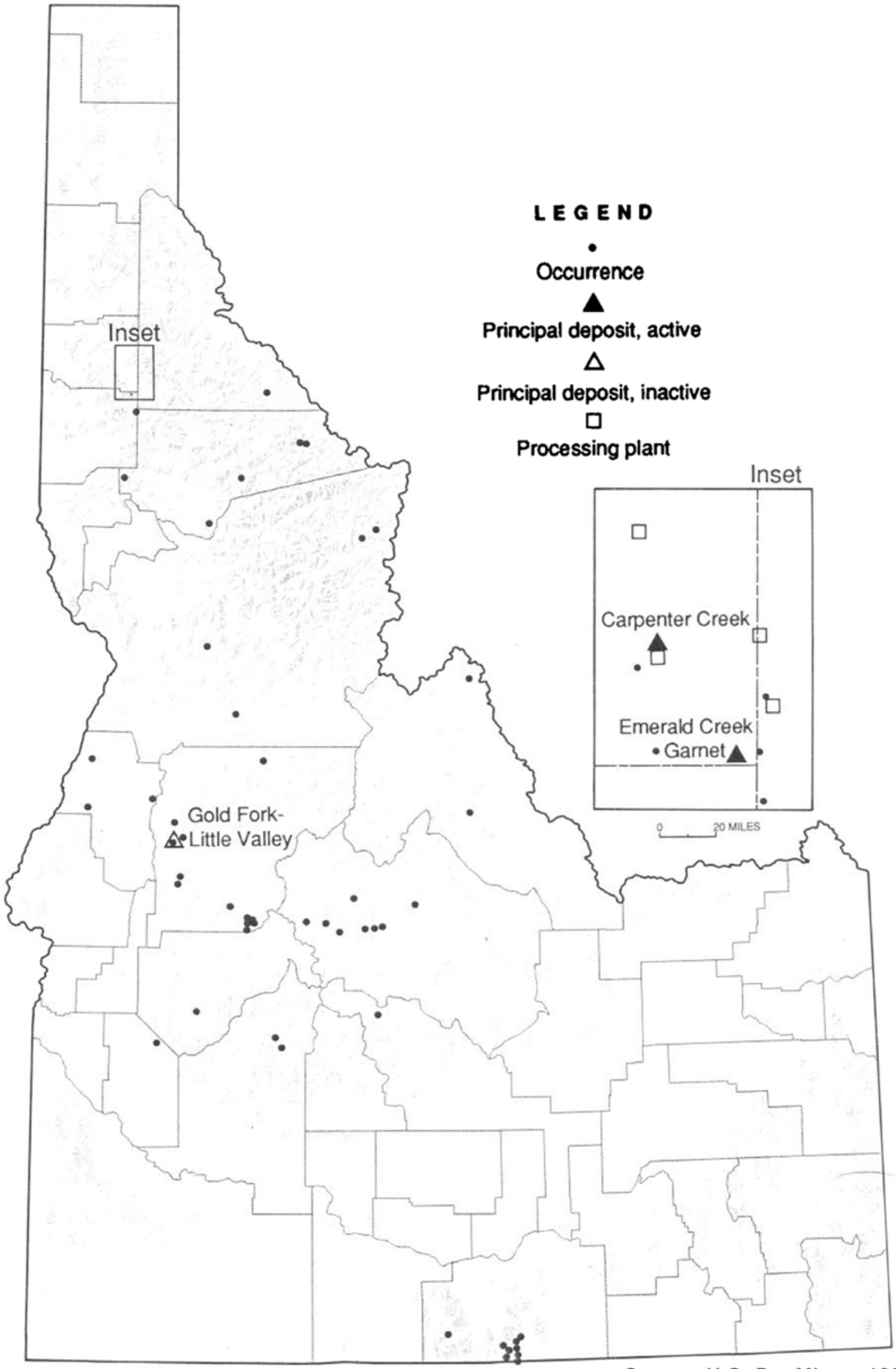
Garnet is plentiful in Idaho, and it is primarily produced from placers that are mined for garnet only and not generally recovered as a by-product of other operations, such as gold placers. The established producers and foreign suppliers adequately supply the domestic market for commercial abrasive garnets, and there appears to be little incentive for additional producers. However, recreational placer operations, such as the one operated by the Forest Service in the Emerald Creek area, will continue to draw interest and activity from the avid and growing population of rock hounds.

Development of garnet-bearing placers, particularly in the Emerald Creek District, is expected to continue at a high level throughout the foreseeable future, based on the extent of historical operations, large resource base, and continued market demand for this product. The expectation for other regions is anticipated to be low, based on uneconomic conditions and competition from the primary garnet producer.

3.2.4.5 Gems

Naturally occurring gems and gem materials have beauty, durability, size, and rarity. The beauty of a gemstone primarily depends on its optical properties, such as color, clarity, and dispersion. The precious gems are considered to be rarer and more beautiful than the semiprecious varieties and include diamond, emerald, sapphire, and ruby. The semiprecious gems include garnets, sillimanite, aquamarine, quartz, opal, jasper, and agate.

Idaho is known as the Gem State because it has several varieties of precious and semiprecious gemstones. The unique and rare star garnet is the state gem and is recovered from the placer operations along Emerald Creek in Latah



Source: U.S. Bur Mines, 1990, Principal Deposits of Industrial Minerals in Idaho, Special Report

Map of Garnet Deposits (Industrial) in Idaho

U.S. Department of the Interior
Bureau of Land Management

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of this data for individual or aggreagate use with other data.

Figure 3-7

R:\New\R:\NEW14880-CottonwoodCDA-RMPs\Photoshop\Garnet.psd - 12/08/04 - PP and Shoshone Counties. Nearly all gemstone recovery is by recreational or rock-hound miners, with only minor commercial recovery usually for sale at rock-shows or other hobby-related functions.

Gemstones are found in a number of localities within the planning area. The Clearwater River Valley in Nez Perce County is one of the few localities in the world for collecting sillimanite (fibrolite), which is prized by rock hounds. Gem-grade garnet is also known from the Little North Fork and the north fork of the Clearwater River, near the Dworshak Reservoir. The Geuda sapphire deposit along the north fork of the Clearwater River could produce sapphires in the future, although technical material upgrade techniques needs to be developed (US Bureau of Mines 1990).

There is substantial acquired land under lease by the BLM in and around the Emerald Creek deposits. Elsewhere there is no BLM land within the vicinity of the other known locations of gemstones in the planning area. The Emerald Creek area will continue to generate considerable attention from recreational miners, as well as the current commercial development into the foreseeable future. Elsewhere in the planning area the potential is considered low due to a lack of mines or prospects.

3.2.4.6 Gypsum and Anhydrite

Gypsum is a naturally occurring hydrous calcium sulfate mineral, and anhydrite is similar but contains no water. Gypsum occurs in evaporate deposits and as hydrothermal emanations from igneous intrusives (US Bureau of Mines 1990).

There are no known occurrences of commercial gypsum or anhydrite within the planning area, so the potential for development is low.

3.2.4.7 Mercury

Mercury (quicksilver) is a metal used in the amalgamation of precious metals and in other special industrial uses. The primary mineral is cinnabar, which is often found associated with ancient shallow hot spring deposits. Mercury was used in the early recovery of gold in placer mining, and consequently many of the creeks may contain high concentrations of mercury. Nearly all mercury used in the United States is imported, with the development of the Idaho deposits occurring only during times of war when prices are exceptionally high (US Geological Survey 1964).

There are no known occurrences of mercury within the planning area, so the potential for development is low.

3.2.4.8 Mica, Feldspar, and Associated Pegmatite Material

Mica, feldspar, quartz, and beryl are the most important pegmatite minerals for commercial development in Idaho. Other minerals of minor importance include columbite, tourmaline, garnet, apatite, and various phosphate and uranium minerals. Pegmatites are coarse crystalline igneous rocks found as lenses or tabular bodies within metamorphic rocks or as late state emanations from igneous rocks, such as the Idaho Batholith. Pegmatites are fairly common throughout the Idaho Batholith and border zones within adjacent metamorphic rocks.

The Avon District in northern Latah County has been one of the most important pegmatite districts in Idaho that produced mica, feldspar, and minor beryl. Most of the area is underlain by mica schist and gneiss, which represent units of the Belt Series adjacent to the Thatuna granodiorite. More than one hundred pegmatites are developed along the margin of the intrusive primarily in the country rock. The larger pegmatites range in length from 30 to 275 feet, with the more productive ones being distinctly zoned and containing a core of massive quartz and a margin of sheet mica. Minor beryl is identified in some of the pegmatite bodies.

About 18 mines and prospects are within an area of three square miles on the south side of Mica Mountain. The largest and most productive in the district is the Muscovite Mine, which was one of the larger producers in the United States during the first half of the twentieth century. Estimated total production from 1910 to 1945 was about 1,000 tons of material, with much of it purchased during World War II by the federal government under the domestic critical minerals program. In 1945 when government stockpile support was withdrawn, all the mica mines in Latah County closed down and have been inactive since then (Hubbard 1957).

There is a substantial acreage of BLM acquired lease land in the area, and one previously closed BLM lease is in the area **(Table 3-2).**

Mineral potential for mica, feldspar, and other accessory minerals in the planning area is moderate, based on the extensive historical development in the Avon District area. Until demand increases for mica, feldspar, beryl, or other pegmatite-related minerals, the development possibility is considered to be low.

3.2.4.9 Molybdenum

Molybdenum deposits can be grouped into four types, based on similarities of geological and physical features: porphyry deposits, contact metamorphic deposits, quartz veins, and pegmatites and aplites. The porphyry or climax type deposits are the most productive, with molybdenite minerals dispersed through large volumes of altered and fractured rock. Associated minerals include pyrite, with tungsten and tin as accessory minerals.

Molybdenum prospects have been known in Idaho since the earliest twentieth century, but only since 1987 has there been commercial development at the large tonnage/low grade open pit Thompson Creek Mine, Custer County. The presence or identification of molybdenum in the planning area is very limited. It is a minor constituent of quartz veins and stringers, which cut dacite and granodiorite in the Orogrande District, Idaho County. At the Helena mine in the Seven Devils region or Adams County, molybdenite and scheelite are associated with tabular bodies of tactite (US Geological Survey 1964).

There are no BLM lands near the molybdenum prospects in the planning area.

Development of molybdenum deposits is low, based on the noneconomic evaluation of the historical prospects in the region. However, molybdenum is often not recognized and may occur at depths of several hundred feet, with only limited surface expression. Deep molybdenum deposits may be discovered and explored in the future, depending on price, demand, and other factors.

3.2.4.10 Phosphate

The major natural occurrence of phosphate is in the mineral fluorapatite and other phosphate minerals disseminated in igneous rocks. In certain marine environments, carbonate fluorapatite and other phosphate minerals are precipitated through biological and chemical activity, which results in economic concentrations (US Geological Survey 1964).

All significant phosphate development in Idaho is in the southeast corner of the state, within unique sedimentary units of the Permian age Phosphoria Formation. It is one of the largest mining districts in the state, producing much of the phosphate consumed in the United States.

There are no equivalent phosphate-bearing rocks in northern Idaho and no phosphate occurrences, so the potential is considered to be low.

3.2.4.11 Refractory Minerals

Refractories are defined as materials that can retain their physical shapes and chemical identities when subjected to high temperatures. The most important types of refractories are fire clay, high alumina, silica, and basic refractory. In Idaho there are a number of historical refractory deposits and a few of current importance. (Refractories made of fire clay are discussed under Section 3.3.5, Salable Minerals; silica refractories are made of relatively pure silica or quartz and are discussed under Section 3.3.3, Salable Minerals). Idaho has a significant amount of high alumina refractories, including kyanite, sillimanite, and andalusite, which have a common chemical composition (aluminum silicates) but a different crystal form and are grouped together under the term kyanite.

The kyanite minerals form primarily in metamorphic rocks where they form by recrystallization of the existing rocks with appropriate composition. In Idaho, the kyanite minerals are formed in contact zones between the Idaho Batholith and older argillaceous rocks of the Belt Series, which creates mica schist containing the refractory minerals.

The kyanite resources in Idaho are unknown, but initial work indicates that they may be substantial. The deposits on the south slope of Goat Mountain (T42N, R4E) in southern Shoshone County and northern Clearwater County are disseminated over a broad area in metamorphic rocks near the Idaho Batholith. Sillimanite deposits near Troy are also extensive but are virtually unexplored. Additional occurrences of sillimanite are found in metamorphic schistose units in the Emerald Creek area near the intersection of Benewah, Latah, and Shoshone Counties. This is in the same area as the placer garnet deposit of Emerald Creek, which are presumably derived from similar units (US Geological Survey 1964).

Extensive BLM acquired lands are present throughout the area at Emerald Creek. There are no BLM lands in the Goat Mountain or Troy prospects area for refractory minerals in the planning area.

The potential is considered low for development of these deposits, due to the lack of information on the extent or quantity of material. Future development would depend on demand, supply, and price for refractory minerals.

3.2.4.12 Salt

Production of salt in Idaho is primarily of historic interest. All production was in southeast Idaho as evaporation of salt spring water in valley and alluvial fill deposits.

There is no indication of any salt occurrences or prospects within the RMP planning area, so its potential for development is low.

3.2.4.13 Tungsten

There are several geological environments where tungsten occurs: tactite or skarn, a metamorphic limestone near intrusive contacts; quartz veins and low-grade disseminations in igneous and metamorphic rocks.

The main tungsten production in Idaho came from extensive disseminated scheelite in the Stibnite Mining District, Valley County. This open pit mine supplied nearly all of the domestic tungsten for the United States during World War II but closed down shortly thereafter when the reserve was depleted.

The only documented occurrence of tungsten in the planning area is in the Tenmile District in Idaho County, which contains scheelite and wolframite in minor quantities in quartz veins cutting metamorphic rocks near the Idaho Batholith boundary (US Geological Survey 1964).

The potential is low due to the lack of information and uneconomic prospects, but the geological terrain is prospective with the presence of reactive carbonate units in the Upper Belt Series in association with Tertiary plutons.

3.2.4.14 Uranium

Uranium is the heaviest common element and is usually present in the mineral uraninite as a primary form. It is moderately soluble in groundwater and is chemically reactive, especially around carbonaceous compounds. The mobile nature of uranium under many groundwater conditions creates a number of uranium oxide compounds. The largest sources of uranium occur as disseminations in nonmarine sandstone, arkoses, and conglomerate, all of which have been recovered in the past in the western United States.

Although there are a large number of radioactive mineral occurrences in Idaho, the state has not been an important producer of uranium. Dredging of the black-sand deposits in Bear Valley, Valley County, was the first development of placer deposits, principally for the recovery of radioactive black-sands. No other placer mining of uranium-bearing black-sands has occurred within the planning area.

Development potential is considered low due to the lack of significant black-sand prospects, the subeconomic nature of the uranium occurrences, and lack of information on the distribution of prospects.

3.2.4.15 Vanadium

Most vanadium in the United States comes from deposits of vanadium- and uranium-bearing sandstone in Colorado, Utah, Arizona, and New Mexico. Although Idaho has not supplied any vanadium ore, anomalous concentrations of vanadium occur in the phosphate rocks mined in the southeast part of the state. Vanadium has been identified in Idaho black-sand deposits at a number of locations (Savage 1961), but information about these occurrences is minimal.

3.2.4.16 Copper

Most copper mined in the state is a by-product of mining other metals, such as lead-zinc, gold, or cobalt The production of copper from Idaho is very low, representing less than one percent of the total copper produced in the United States (US Geological Survey 1964).

Production within the planning area has been too small to record and has come primarily from polymetallic veins that were mined for gold. There are no indications of any significant porphyry copper systems within central Idaho, although major copper mining companies have explored for it over the past several decades. The geological conditions are apparently not favorable for the concentration of copper in the intrusive systems of central Idaho.

Potential is considered low for the discovery or development of significant copper resources in the planning area.

3.2.4.17 Iron

There is no significant production of iron in Idaho. In 1961 the Idaho Bureau of Mines and Geology, in cooperation with the US Bureau of Mines, undertook a project to evaluate the iron resources of Idaho. The unpublished report concluded that there was minimal potential for significant iron resources in Idaho (US Geological Survey 1964).

It is concluded that there is low potential for the development of iron ore deposits in the planning area.

3.3 SALABLE MINERALS

Salable minerals disposition is addressed under the Materials Act of 1947 (61 Stat. 681), as amended by the acts of 1955 (PL-167: 69 Stat. 367),1962 (PL-87-713) and the Federal Aid to Highway Act of 1958 (Section 317). These acts authorized that certain mineral materials be disposed of either through a contract of sale free-use permit or right-of-way. This group of mineral materials, commonly known as salable minerals, includes but is not limited to common varieties of sand, stone, gravel, pumice, cinder, clay, and petrified wood in public lands of the US (Maley 1977). Unpatented mining claims cannot be located for salable mineral materials, and removal of these types of material without a permit may constitute a trespass.

The differentiation between common and uncommon varieties of materials is not easily defined, with several judicial decisions involved in providing a determination as to the definition. The Materials Act provides for an exception to "uncommon variety" minerals that are open to location if they can be proven to be of unique character. Uncommon varieties are valuable because the deposit has some property giving it distinct and special value (Maley 1977).

Paleontological resource management is a recently evolving situation whereby certain fossil-collecting sites on BLM lands are under the management direction of the BLM. The guidelines for this are in BLM Handbook H-8270-1 (General Procedural Guidance for Paleontological

Resource Management) and BLM Information Bulletin 98-163 of July 22, 1998.

Petrified wood is covered under the act of 1962 (76 Stat. 652), which removed petrified wood from the locatable mineral category and provided that it be available to the public on a free-use basis in limited quantities. Quantities above the specified amounts are subject to the regulations for salable minerals (Maley 1977).

Salable minerals primarily include what is commonly referred to as industrial minerals, which are defined as "any rock, mineral, or other naturally occurring substance of economic value, exclusive of metallic ores, mineral fuels, and gemstones" (US Bureau of Mines 1990). The major characteristics of the industrial minerals are the diversity of origin and occurrence, the variety of production quantity and unit value, and the range of properties and end uses. Economic cycles tend to be less disruptive for industrial minerals than for metals because they are used primarily in nondurable products, such as chemicals and paper, although certain other more durable products, such as aggregate, silica sand, or decorative stone, are considered long lasting in character.

A large part of the value of the salable minerals results from its geographic location in respect to the end user, which gives it a high place value. The value of commodity decreases rapidly with increased distance from the production source; for example, ordinary sand and gravel are valuable commodities if situated near an industrial or construction center. Specification as to the quality of the material is another important factor in determining value, particularly in road base and construction material.

Salable minerals known to be present within the planning area include but are not necessarily limited to sand, gravel and crushed aggregate, silica sand or quartzite, limestone, common clay, decorative stone, fossils, and petrified wood.

3.3.1 Sand and Gravel and Quarry Rock

Sand and gravel production composes the largest mineral industry in Idaho in terms of tonnage and value. In 2002, the sand and gravel industry produced over 15,700,000 metric tons, at a value of over $56 million (US Geological Survey 2004) and production has increased substantially since that time. In the planning area, the sand, gravel, and aggregate resources are ubiquitous and have been developed throughout the region. Major uses are for highway construction for subbase, base, surfacing, concrete, and embankment material. The primary sources of sand, gravel, and crushed stone are as follows:

- Alluvial material in the Snake, Salmon, and Clearwater Rivers; and
- Basalt is the primary aggregate source rock obtained from Columbia River basalt flows at locations along the western Idaho border, from the southern half of Kootenai County to southern Idaho County.

The sand, gravel, and aggregate occurrences within the planning area are shown in **Figure 3-8** for District 2, which encompasses all of the planning area. It has 106 sites for sand, gravel, and aggregate in District 2 (Lewiston District) **(Appendix G).** Currently there are two authorized cases and one pending case **(Table 3-3)** on BLM land that have seen activity and may see more development in the future.

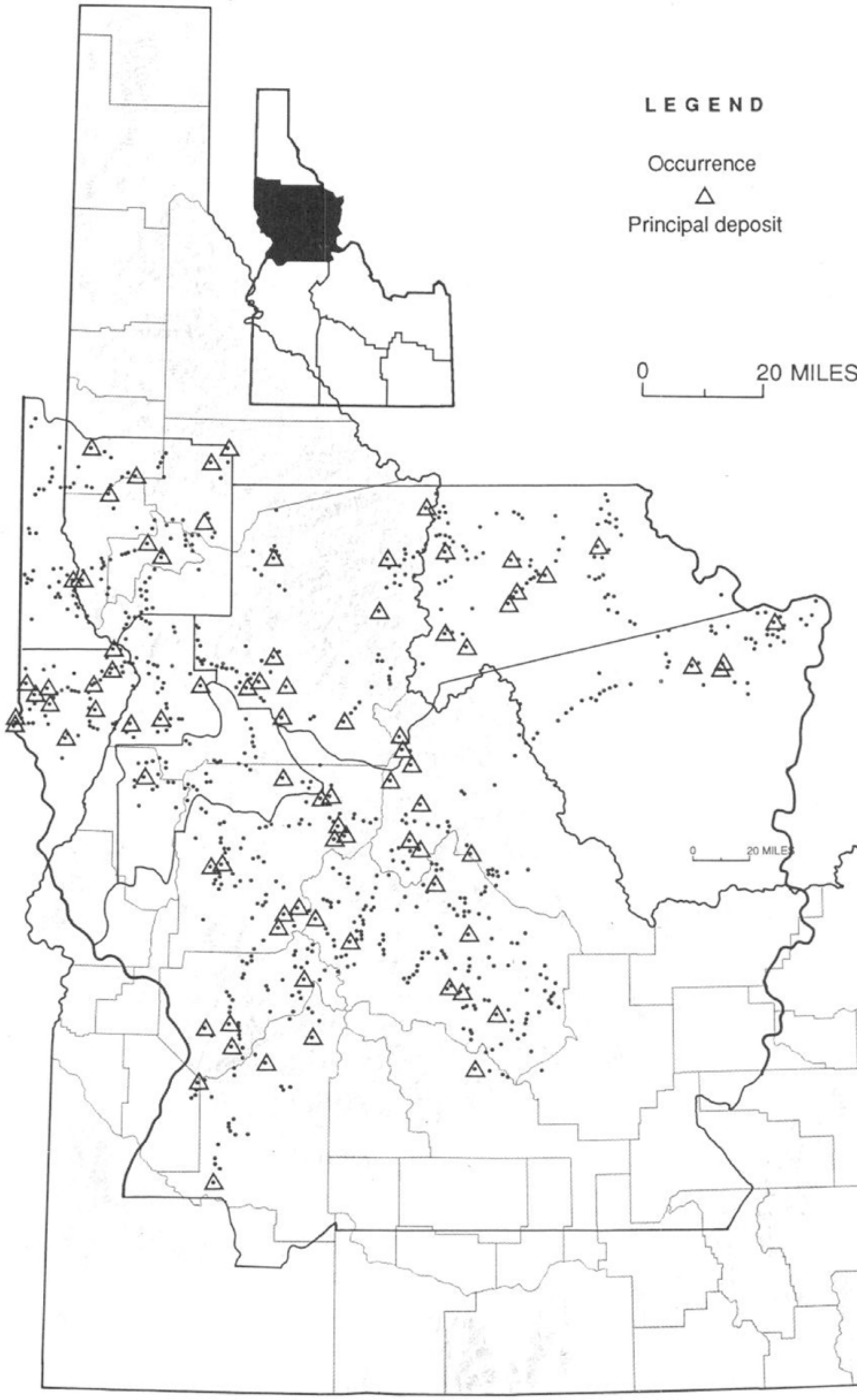
Political and social trends that tend to restrict the availability of sand, gravel, and crushed stone in Idaho are becoming more prevalent in some areas, particularly around urban centers. Zoning laws reduce the number of local sources and require that material be obtained from sources farther away from some of the urban areas where aggregate demands are strongest. Access to many of the alluvial sources along the major rivers is limited by state and federal restrictions, such as the Wild and Scenic River designations, which tend to isolate some sections of the highway system from nearby low-cost aggregate sources. All of these factors increase the pressure on obtaining high quality-low cost material in favorable locations and may cause an increase in evaluating and developing more distant sources that could occur on BLM lands within the planning area.

Demand for sand, gravel, and aggregate will remain high, with the concentration of development on sites that are in close proximity to the point of usage. The widespread location of BLM lands within areas of potential material sites will undoubtedly be of interest to future development.

3.3.2 Pumice and Pumicite

The properties that make pumice and pumicite useful in the construction and industrial applications include low-bulk density, good heat and sound insulation properties, fire resistance, and excellent abrasive capabilities.

Pumice is a pyroclastic rock formed by explosive volcanic activity, usually occurring in silicic volcanic eruptions of rhyolite or dacite. It is characterized by a cellular texture produced by the violent expansion of dissolved gases. Pumicite, also called volcanic ash, is pumice subjected to additional transportation, where the cellular structure is broken down to form a fine-grained unconsolidated material. Nearly all of the explosive rhyolitic activity is restricted to southern Idaho, along the Snake River Plain. In northern Idaho, the mafic Columbia River Basalts are not geologically favorable for the development of pumice or pumicite (US Bureau Mines 1990).



Source: U.S. Bureau of Mines, 1990, Principal Deposits of Industrail Minerals in Idaho, Special Report

Map of Sand, Gravel and Crushed Stone in Idaho, District 2

U.S. Department of the Interior
Bureau of Land Management

Figure 3-8

There are no known occurrences of pumice or pumicite within the planning area.

3.3.3 Silica/Quartzite

Silica has many diverse uses because of its hardness, resistance to high temperatures, and chemical action. The largest markets use it in glass manufacturing, as foundry sand and an abrasive, as fracturing sand, and for filtration. The uses of the silica sand depend on its chemical, physical, and mineralogical characteristics. The minimum silica content for the glass industry is 96 percent, although other varieties, such as amber glass, may accept 80 percent. Sand for the better grades of glass should be 99 percent, with less than 0.030 percent Fe_2O_3 and 0.020 percent Al_2O_3, with no other significant contaminants. Usually it must have 95 percent of its grains between US standard sieve sizes of 20 mesh and 140 mesh. The quality must be guaranteed by the supplier, and uniformity of grade must be maintained (US Bureau of Mines 1990).

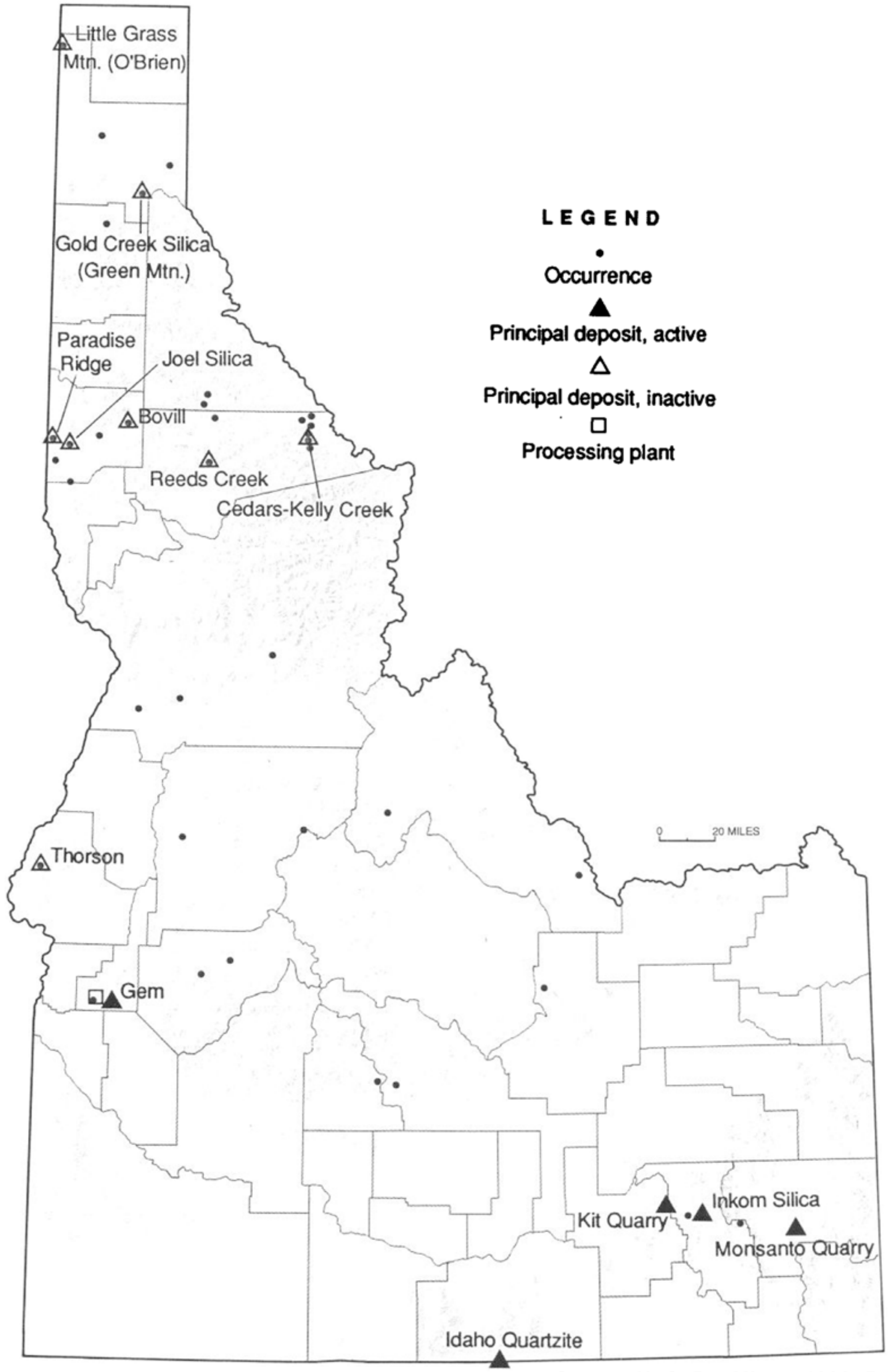
The silica industry in Idaho has been variable over time, but the only current active producer is Unamin Corp., operating a plant in Gem County. In southeast Idaho there are two quartzite producers who market metallurgical grade quartzite.

Past production within the planning area occurred at the Bovill Clay deposit, Latah County, where it was recovered as a co-product of the clay operation by J. R. Simplot Co. from 1960 to 1964. This operation was developed by separating the clay and sand particles into different clay and sand products. In 1962, some of the silica was shipped for foundry uses, but this ended with the closure of the clay mine (US Geological of Survey 1964). Other occurrences are noted near Troy (Joel Silica) in Latah County and Cedars-Kelly Creek and Reeds Creek in Clearwater County. All of these locations are inactive prospects. Locations of the occurrences are shown in **Figure 3-9** and are listed in **Table 3-7** (US Bureau of Mines 1990).

Table 3-7
Principal Silica Deposits of Northern Idaho

Deposit	County	Status	Commodity	Year
Bovill	Latah	Inactive, producer	Clay, silica co-product	n.a.
Cedars-Kelly Creek	Clearwater	Inactive, prospect	Silica, sandstone	n.a.
Joel Silica	Latah	Inactive, prospect	Silica, quartzite	n.a.
Paradise Ridge	Latah	Inactive, prospect	Silica, quartzite	n.a.
Reeds Creek	Clearwater	Inactive, prospect	Silica, quartzite	n.a.

Source: US Bureau of Mines 1990



Source: U. S. Bur Mines, 1990, Principal Deposits of Industrial Minerals In Idaho, Special Report

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Map of Silica Deposits in Idaho

U.S. Department of the Interior
Bureau of Land Management

Figure 3-9

Quartzite is a light gray to white, hard, granular, layered rock, consisting primarily of grains of quartz, which is exposed over much of northern Idaho where it forms a large proportion of the Belt Super Group. This unit is limited in its distribution within the planning area.

There is no BLM land near any of historic silica/quartzite prospects within the planning area. There is no production of silica or quartzite within the planning area.

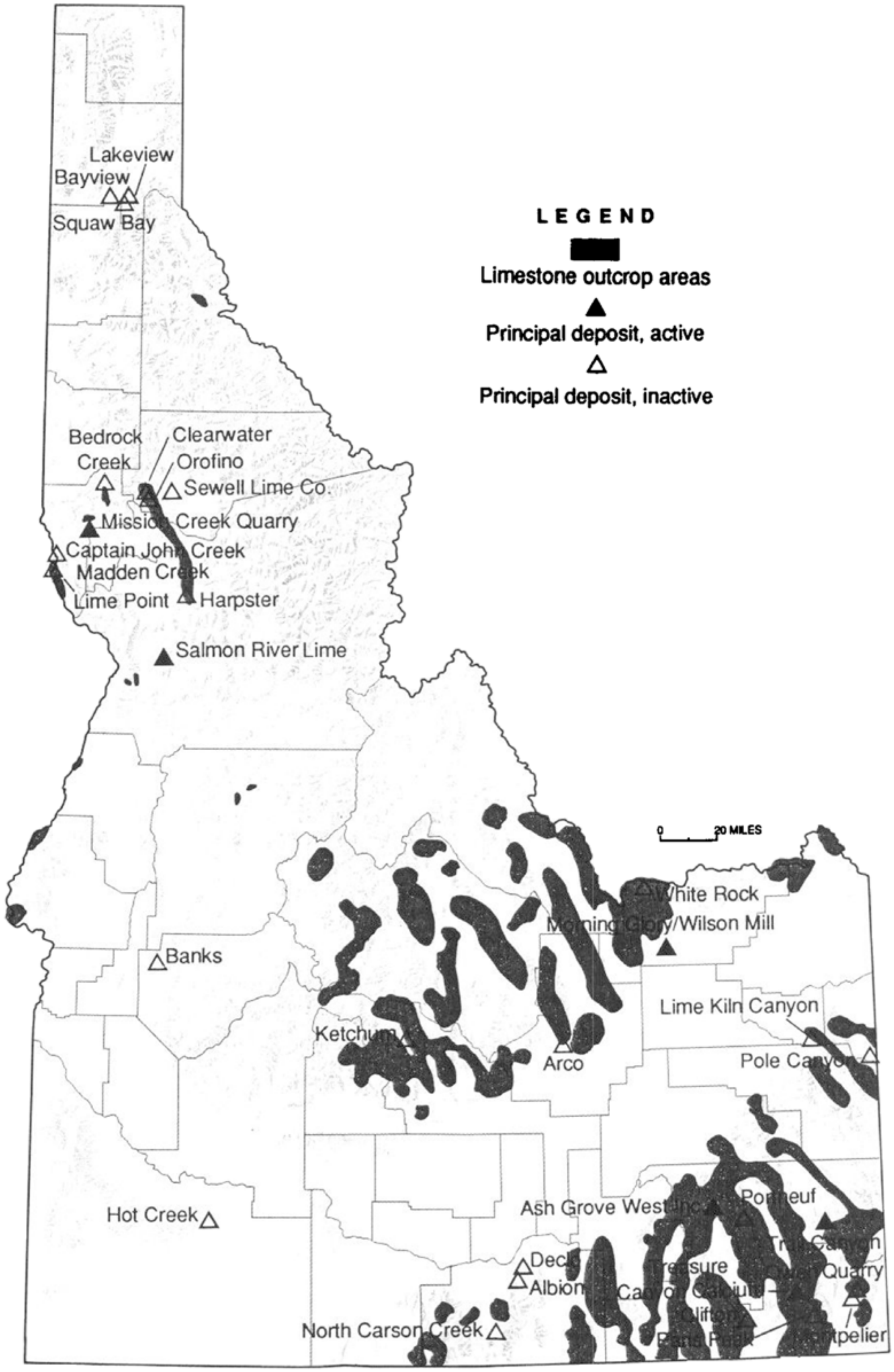
3.3.4 Limestone

Limestone is a generic term commonly used to describe rocks in which calcite is the main constituent. Limestone is formed primarily within a marine sedimentary environment, with only minor amounts forming from rare hot spring activity. Commercial classification of carbonate rocks is based on the relative amounts of lime, magnesia, and silica that determine the applications for usage. The two primary uses of limestone are in the portland cement industry and production of crushed stone for road aggregate. Other uses include steel flux, metallurgical applications, fillers, pulp and paper manufacture, sugar refining, fertilizers, and animal feed.

Limestone mining and development has been a significant industry, with over ten producers located within the planning area over the past 100 years. Principal deposits are found in Nez Perce, Clearwater, and Idaho Counties. The historic limestone producers or resources are outlined in **Table 3-8.** The main limestone producers within Idaho are shown in **Figure 3-10.** Currently the only operating limestone quarry in Idaho is the Ash Grove Mine at Inkom, Bannock County, which produces over 340,000 tons of limestone for a local cement plant.

Table 3-8
Principal Limestone Deposits of Northern Idaho

Deposit	County	Status	Commodity	Year
Bedrock Creek	Nez Perce	Inactive, past producer	Limestone, lime	1956
Captain John Creek	Nez Perce	Inactive, past producer	Limestone, cement	1960
Clearwater	Clearwater	Inactive, past producer	Limestone, crushed	n.a.
Harpster	Idaho	Inactive, past producer	Limestone, crushed	n.a.
Lime Point	Nez Perce	Inactive, past producer	Limestone, cement	1960
Madden Creek	Nez Perce	Inactive, past producer	Limestone, cement	n.a.
Mission Creek	Nez Perce	Active, producer	Limestone, crushed	1988
Orofino	Clearwater	Inactive, past producer	Limestone, cement	n.a.
Salmon River Lime	Idaho	Active, producer	Limestone, crushed	1990
Sewell Lime Co.	Clearwater	Inactive, past producer	Limestone, cement	n.a.



Source: Idaho Bureau of Minesand Geology 1955

Map of Limestone Deposits in Idaho

U.S. Department of the Interior
Bureau of Land Management

Figure 3-10

The primary limestone unit within the planning area is the Martin Bridge limestone of Triassic age, which extends northeasterly from Riggins to Orofino in a series of discontinuous exposures. This fragmentation of the limestone units is related to extensive folding and faulting related to the Wallowa-Seven Devils Terrain and the Western Idaho Suture Zone. The unit is highly metamorphosed and converted to marble in a number of localities with associated schist and gneiss and intruded by granitic bodies in various localities. Thickness is variable but it can be up to 2,000 feet thick with surface exposures over several thousand feet.

The presence of extensive limestone resources in the Orofino area has been known and mined over the past century. Development of the resource has been intermittent, based on local demand for aggregate material and feedstock for a local cement plant, which has been closed down. A number of locations have been mined from discontinuous outcrops of limestone that extend for over fifty miles, from Orofino to Harpster.

The Clearwater Lime Products Company mined limestone during the 1920s from a number of quarries north of the town to supply the agriculture and crushed aggregate industry. The Sewell Mining Company developed a mine along the south side of Orofino Creek Canyon, east of Orofino, and mined high calcium lime for the cement industry. None of these quarries are currently in operation. Calcium carbonate content ranges from 89 to 94 percent (Savage 1969).

In the Harpster area, Idaho County, along the south fork of the Clearwater River, a large deposit of limestone contains good quality material that has been mined for cement and agricultural usage. It ranges from 60 to 200 feet in thickness and has a persistent strike length of several thousand feet. It is not currently in operation (Savage 1969).

South of Lewiston are a number of limestone deposits and prospects that have received extensive evaluation. Currently, the main limestone producer is developed at Mission Creek on the Nez Perce Reservation, where material is mined for crushed aggregate and is sold intermittently to the Potlatch paper mill in Lewiston. It is estimated that there is a resource of 10 million tons (Savage 1969).

A significant resource of limestone is present along the Snake River at Lime Point Prospect, where it is estimated that there is a resource of 600 million tons (Savage 1969). Currently, access to the area is limited and future development depends on increased demand for the product and the development of a good transportation system. The BLM holds a significant land position in the general area north of the confluence of the Salmon and Snake Rivers, which may contain part of the limestone prospect.

In the Riggins area the Martin Bridge limestone extends for over thirty miles northeasterly, from the Snake River to exposures at Slate Creek, Idaho County. The Salmon River Lime Company operates a quarry on this deposit north of Riggins, which is used for crushed lime.

Discontinuous scattered parcels of BLM land are present within the general location of the potential limestone resources. In the Lime Point area there are sizeable blocks of BLM land that may be important for future resource development, when lime may be considered for decorative or landscape material.

3.3.5 Clay

Clay is a naturally earthy, fine-grained material composed of a group of crystalline minerals known collectively as the clay group. The minerals are a hydrous aluminum silicate composed primarily of silica, alumina, and water. The six different classifications of clay are kaolin, ball clay, fire (refractory) clay, bentonite, fuller's earth, and common clay.

The clays of northern Idaho have been classified into three categories, described below.

Granitic Residual. These clays are the result of intense weathering of granite or granodiorite. Kaolinite and halloysite are the primary minerals found in the residual clays, which also contain variable amounts of quartz and mica recovered as a co-product. These deposits are zoned with increasing amounts of unaltered feldspar and biotite at depth grading into the unweathered host granite.

Basaltic Residual. These clays result from intense weathering of lower flows of the Columbia River Basalt when the climate was more humid and warm. This residual clay developed in response to an intense deep weathering event, termed the excelsior weathering period. It occurred as an intra basalt flow cycle that reached maximum intensity several million years ago. Kaolinite and halloysite that are stained by titanium-iron oxide make up most of the clay.

Transported Clays. These clays form the bulk of the deposits and are lacustrine or fluvial deposits in which clay, sand, gravel, some carbonaceous matter, and iron oxide are intermingled. The principal clay is kaolinite, and in some places there are beds of almost pure clay. The Bovill clay deposit is about 89 percent transported clay.

In the 1990s there were six companies mining clay in Idaho, two for refractory clay, two for bentonite, and two for common clay. Recently, however, the market for the refractory clays and drilling clays has declined, and currently there are only two clay operators in the state that are outside the planning area. The principal clay deposits in northern Idaho are outlined in **Table 3-9** and shown in **Figure 3-11**.

Table 3-9
Principal Clay Deposits of Northern Idaho

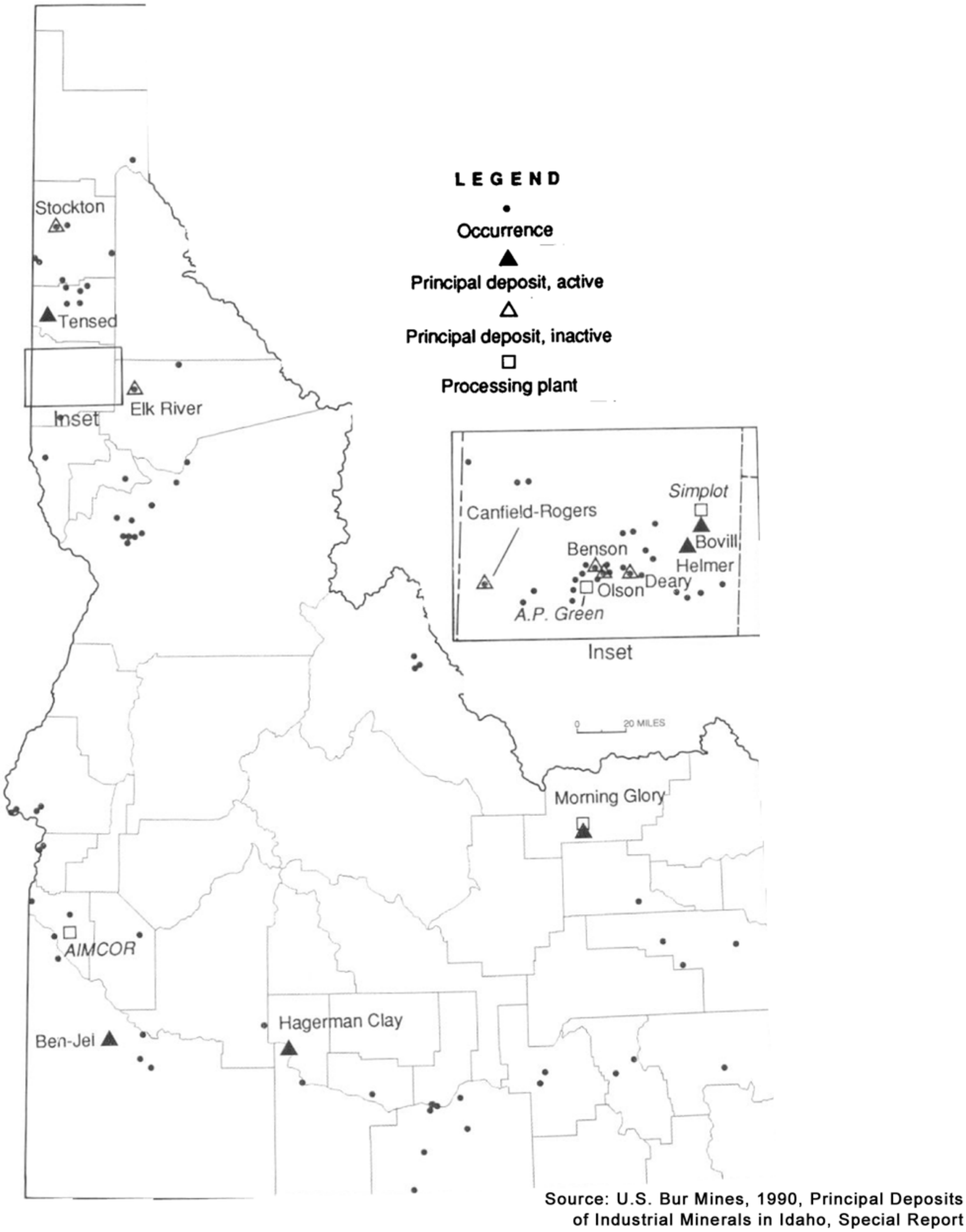
Deposit	County	Status	Commodity	Year	Reserves
Benson	Latah	Inactive, past producer	Clay, refractory	1945-56	130 million tons
Bovill	Latah	Inactive, past producer	Clay, filler	1960-63	50 million tons
Canfield-Rogers	Latah	Inactive, past producer	Clay, refractory	1945	207 million tons
Deary	Latah	Inactive, explored	Clay, refractory	1956	10 million
Elk River	Clearwater	Inactive, explored	Clay, refractory	n.a.	n.a.
Helmer	Latah	Inactive, past producer	Clay, refractory	n.a.	n.a.
Olson	Latah	Inactive, past producer	Clay, refractory	1945	69 million tons

Source: US Bureau of Mines 1990

A large area containing scattered high kaolin clay deposits extends from Coeur d'Alene in the north to Grangeville in the south, primarily underlain by weathered Thatuna granite and Columbia River basalt flows. The majority of the clay deposits are in a clay belt that extends across Latah County (Hosterman et al. 1960).

Significant interest in the clay deposits of Idaho was generated during World War II as a possible source of high kaolin clays under the Strategic Minerals Program. Over the years other commercial uses for Idaho clays have included paper fillers, fire clays for ceramics, and refractory clays.

The clay deposits in Latah County are a significant resource that has been developed intermittently over the past century. Historical production was concentrated on the refractory fire clays that provided feedstock for the brick operations around Moscow, Idaho. The federal government extensively evaluated some of the deposits during World War I in order to provide critical material. The US Bureau of Mines drilled several of the deposits during this period to determine resource potential. The Anaconda Company was evaluated during the 1950s to provide a source of alumina-bearing clay for its aluminum operations in Montana, but there were no follow-up mining operations. Significant production of clay after World War II continued at a moderate level from deposits at the Benson and Helmer pits near Troy, which mined for a refractory product. In 1956 the J. R. Simplot Co. investigated the Bovill area for clays for ceramics and as filler for the paper industry. A J. R. Simplot Co. processing plant in the Bovill area recovered material from 1960 to 1974, including silica as a co-product. Production ceased due to market conditions rather than a lack of clay reserves. One or more of the pits has been mined intermittently up to the present, as economic conditions permit. Recent BLM and private leases in the area from 2000 to 2003 indicate a further interest by companies in developing this resource.



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Map of Clay Deposits in Idaho

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No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of this data for individual or aggreagate use with other data.

Figure 3-11

At least seven distinct clay deposits have been evaluated and mined in Latah County. A map of the various clay deposits in Latah County is included in the Hubbard report (Hubbard 1957). These clay deposits are outlined below.

3.3.5.1 Canfield Rogers Clay Deposit

These deposits adjoin the town of Moscow on the east and north, covering approximately 8,000 acres. Most of the clay is of the transported granitic type deposited on flat-lying basalt that was also partially weathered. Thin cover consists of Palouse Formation soil or valley alluvium. Clay was mined from at least three pits, and it is estimated that 5,000 to 7,000 tons of material was mined in the 1920s. Between 1943 and 1944 the US Bureau of Mines drilled several auger holes, which indicated a substantial clay resource. On the basis of this work, the Anaconda Mining Company acquired more than 1,000 acres of land in the area and completed test drilling but never mined on the property (Hubbard 1957), which is estimated to contain approximately 207 million tons (US Geological Survey 1964).

3.3.5.2 Benson Clay Deposit

These deposits include some of the oldest clay pits in the county. They are northeast of Troy and cover about 1,800 acres. The clay is primarily of the residual granite type, which is unique for most of the deposits in the county. The Troy Firebrick Company mined in the Benson pit from 1930 to 1955 and produced over 150,000 tons of material. Resources are estimated to be about 130 million tons (US Geological Survey 1964).

3.3.5.3 Olson Clay Deposit

This clay-bearing area is about three miles west of Deary and covers roughly 2,000 acres. The clay is primarily of the transported variety derived from the Thatuna granodiorite. Drilling by the US Bureau of Mines indicated a substantial resource, and, based on this result, the Anaconda Mining Company acquired the property and completed test drilling and pitting in 1954-1955 but did not conduct any mining. Subsequently, the A. P. Green Firebrick Company acquired the property and has mined intermittently for fire clay. It is estimated to contain a resource of 69 million tons (US Geological Survey 1964).

3.3.5.4 Stanford Clay Deposit

About two miles north of the Olson deposit is the Stanford clay deposit. Drilling results indicate it is transported granitic clay deposited on flat-lying basalts. Some weathering of the basalt has formed a residual basaltic layer beneath the transported clays. The Bureau of Mines drilled there during World War II, but little information is available on the results.

3.3.5.5 Deary Clay Deposit

A small clay-bearing area designated the Deary clay deposit is about two miles south of Deary and covers about 115 acres. Results of the Bureau of

Mines drilling indicate it is a transported clay deposit of granitic material overlying fresh basalt. Although the acreage of the property is small, it has unusual thickness for clay material and averages 40 feet. The Anaconda Company tested the deposit but never mined it. It is estimated to have a resource of 10 million tons (US Geological Survey 1964).

3.3.5.6 Helmer Clay Deposit

In 1960, the J. R. Simplot Co. developed this clay-bearing area just north of Helmer. The clay was of poor quality and mining was shifted to the adjacent Bovill clay deposits.

3.3.5.7 Bovill Clay Deposit

This deposit lies southwest of the town of Bovill in the eastern part of Latah County. Drilling by the US Bureau of Mines during World War II indicated a large area of over 1,500 acres that could be clay bearing. Subsequently the J. R. Simplot Co. acquired the property, conducted test drilling and evaluation, and mined the deposit from 1960 to 1974. The clay is primarily of the transported granitic type, underlain by basaltic residual clay. It is estimated to contain a resource of 50 million tons (US Geological Survey 1964).

Intermittent commercial interest in redeveloping the existing clay resource is possible as increased demand for the product, proximity to emerging markets, and new cost-effective mineral-recovery technology becomes available.

Prior production within this favorable clay belt has been extensive, with the development of several mines by a number of companies from the 1950s nearly to the present day. The clay deposits have not been mined out, but operation has terminated due to adverse economic conditions.

3.3.6 Dimension Stone

Almost any well-consolidated resistant rock can be used for dimension stone, based primarily on the physical properties that pertain to workability, durability, and aesthetic appeal. Historically, only rock that was cut and finished to a predetermined size and shape was considered dimension stone. However, this has been supplanted by the increased demand for ornamental stone used for landscaping or decorative purposes in the construction industry. The most prominent material in Idaho is the Oakley Stone in Cassia County and the Three Rivers Quarry near Challis, Custer County.

Recently the landscaping industry has been interested in the Columbia River Basalt flows. Much of the western part of the planning area, between Lewiston, Grangeville, and Riggins, is underlain by the Columbia River Basalt. It is well exposed south of Lewiston, along the Snake River to the confluence with the Salmon River. Other potential dimension stone materials include limestone, quartzite, and granite sources. In general, location and transportation costs are less of a factor than attractive quality of the landscaping stone in determining the commercial development of a site.

There is a moderate amount of BLM land in this general area, although specific sites for attractive dimension stone cannot be determined. Currently there are no BLM sales contracts for dimension stone within the planning area.

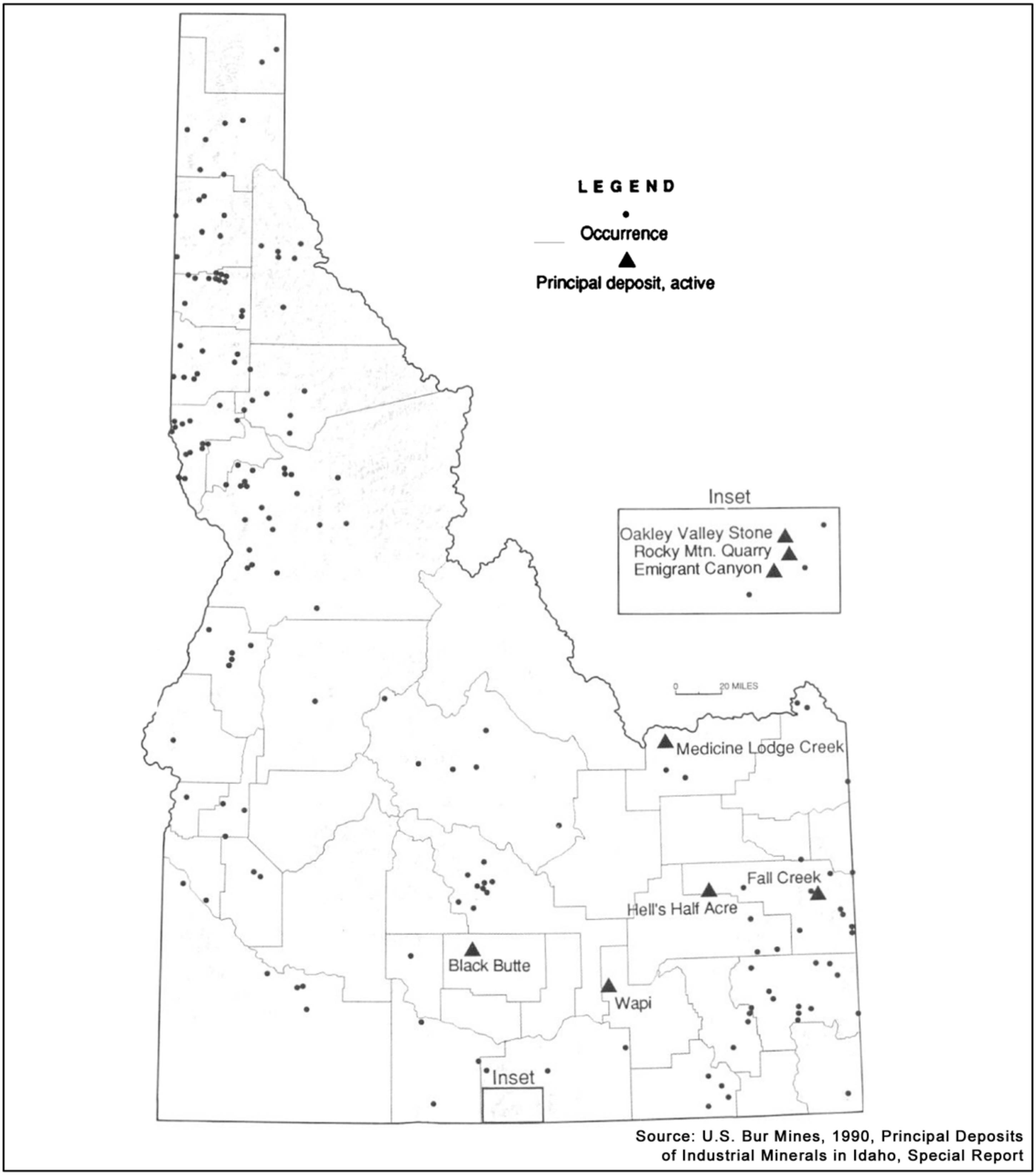
Potential dimension stone can be found almost anywhere throughout the planning area and it can be expected to be developed in the future. It is not possible to predict where this material will be found, due to the wide variety of geological environments.

3.3.7 Other Material

Other materials, such as petrified wood, agate, or unique invertebrate fossils, may be included under the heading of salable material, depending on the circumstances and amount of material being collected. The public can collect petrified wood and other polished stones, such as agate, subject to BLM regulations. The number of rock-hound collectors will continue to expand in the future as the interest in this hobby grows.

Fossil collecting continues to expand in popularity as the public discovers or learns about unique fossil collecting sites. The presence of fossil plants in sediments inter-bedded with the Columbia River basalt has been known for many years. Numerous sites have been identified along the edge of the Columbia River Plateau in Idaho, Washington, and Oregon. The Clarkia Fossil Beds in Shoshone County are one of the unique localities for Miocene fossil plants in the world, due to the quantity and quality of preservation. Researchers have recently discovered fossilized DNA within the leaves (Smiley 1989).

The BLM has acquired lands in and near the Clarkia fossil beds and elsewhere throughout the planning area where possible fossils may be discovered. Activity by amateur collectors as well as researchers is expected to increase in the future.



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Map of Dimension Stone in Idaho

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Figure 3-12